Experience Sharing to Enhance Safety from an Airline Perspective

Capt Rob Legg and Sian Evans

5-7th October 2015, Barcelona, Spain

easyJet

Contents

> Work-As-Done is Work-As-Imagined until verified

Characterising the nature of routine, everyday flights

How can airlines and ANSPs learn from each other?

> Taking a systems approach

Re-thinking approaches to risk management

Developments in safety culture

> Conclusions

Something about us…

> What we do:

We are low-cost European point-to-point short-haul airline.

> Where we do it:

Intra-European short-haul network.

700+	64.8m	32	24	230	2500
routes	passengers	counties	crew bases	aircraft	pilots

A typical crew day

100+
destinations

easyJet
Thu ,01 Oct 2015

PERSONAL CREW SCHEDULE FROM 01/07/2015 TO 31/07/2015
All times in UTC, Scheduled, showing crew check-in/check-out times

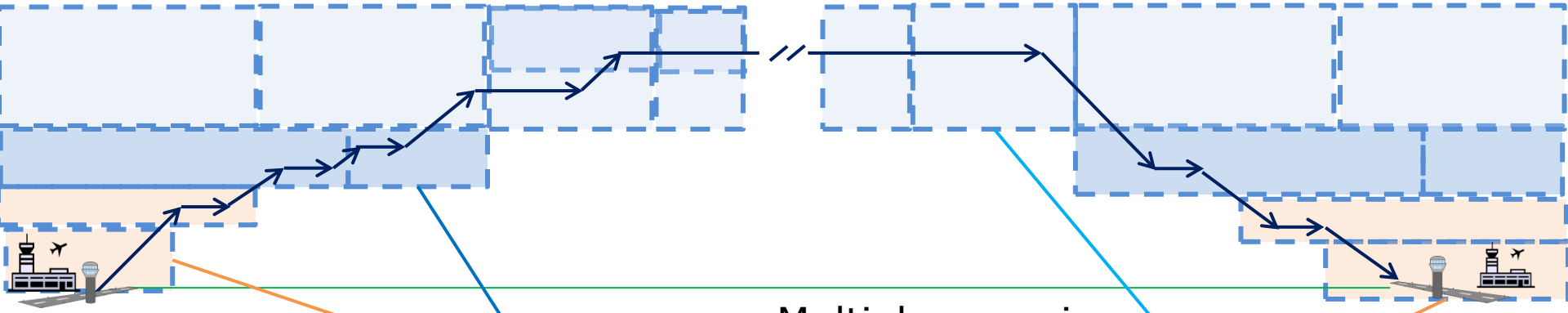
NAME : [redacted]
ID : [redacted] (LGW CP-319,320,320S,319S FO-320,320S,319,319S)

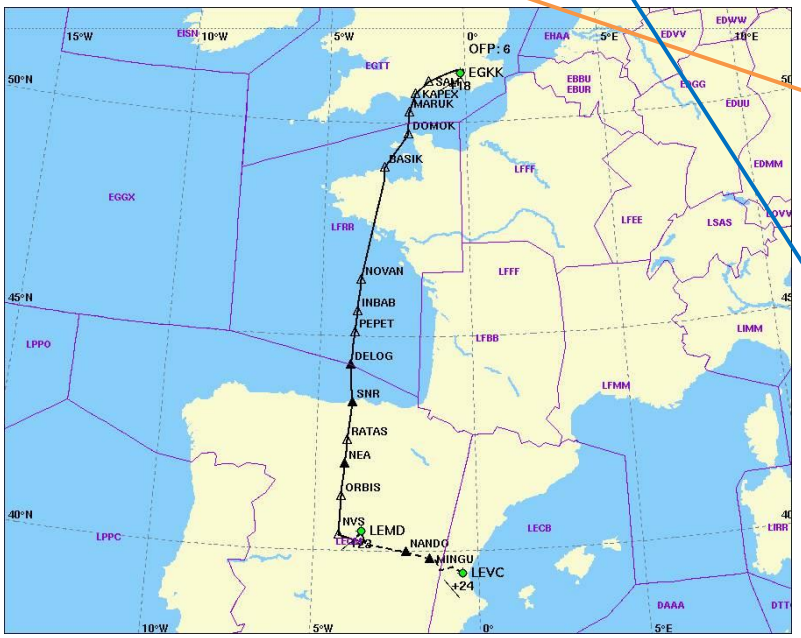
Jul01 Wed	Jul02 Thu	Jul03 Fri	Jul04 Sat	Jul05 Sun	Jul06 Mon	Jul07 Tue	Jul08 Wed	Jul09 Thu	Jul10 Fri	Jul11 Sat	Jul12 Sun	Jul13 Mon	Jul14 Tue	Jul15 Wed	Jul16 Thu	Jul17 Fri	Jul18 Sat	Jul19 Sun	Jul20 Mon	Jul21 Tue	Jul22 Wed	Jul23 Thu	Jul24 Fri	Jul25 Sat	Jul26 Sun	Jul27 Mon	Jul28 Tue	Jul29 We	Jul30 Thu	Jul31 Fri
M 893 14:00 15:00 LGW GLA 16:25 M 894 16:50 GLA LGW 18:15 M 895 18:45 LGW GLA 20:10 M 896 20:40 GLA LGW 22:10 23:14	DDO	D/O	D/O	D/O	D/O	LVE	B 8603 06:00 07:00 LGW AGP 09:50 B 8604 10:25 AGP LGW 13:15 14:13	OWN 03:35 03:35 *LGW XBH 04:00 SIMI 05:30 09:30 OWN 10:30 *XBH LGW 10:55 10:55	8549R 04:25 05:25 LGW LGW 07:55 FO 8549 05:25 LGW MJV 07:55 FO B 8550 08:30 MJV LGW 11:05 13:40 FO	O 8961 04:45 05:45 LGW NTE 07:05 FO O 8962 07:35 NTE LGW 08:50 FO O 833 09:25 LGW BFS 10:50 FO O 834 11:35 BFS LGW 12:55 13:31 FO	D/O	D/O	D/OR	K 5479 14:30 15:30 LGW MAD 17:55 FO K 5480 18:30 MAD LGW 20:50 22:28 FO	M 8577 14:40 15:40 LGW BCN 17:45 M 8578 18:20 BCN LGW 20:40 21:10	B 5337 12:10 13:10 LGW TLS 14:55 B 5338 15:40 TLS LGW 17:25 B 5015 17:55 LGW BOD 19:25 B 5016 19:50 BOD LGW 21:20 23:02	5285 11:20 12:20 LGW LIN 14:15 5286 14:50 LIN LGW 16:40 5057 17:15 LGW MPL 19:05 5058 19:35 MPL LGW 21:25 22:49	D/O	D/O	K 5113 05:10 06:10 LGW ZRH 07:50 K 5114 08:20 ZRH LGW 10:00 F 5055 10:30 LGW MPL 12:20 F 5056 12:50 MPL LGW 14:40 16:30	ESBY 05:30 13:40 8597 13:40 14:40 LGW DUS 16:00 8598 16:35 DUS LGW 18:00 18:35	D/O	D/O	K 5355 06:10 07:10 LGW VIE 09:25 K 5356 10:00 VIE LGW 12:20 13:32	8415 06:10 07:10 *LGW LYS 08:50 10:11	X 4301 04:00 05:00 LYS BOD 06:10 FO X 4302 06:40 BOD LYS 07:50 FO X 4371 08:20 LYS SXF 10:20 FO X 4372 10:50 SXF LYS 12:45 FO 8418 16:45 *LYS LGW 18:15 18:37	D/O	856 09: 10: LG CT 13: (32	8963 12:55 13:55 LGW NTE 15:20 8964 15:50 NTE LGW 17:05 8437 17:40 LGW BSL 19:10 8438 19:40 BSL LGW 21:10 21:5	D/O

20 Different Airports
LGW
GLA
AGP
MJV
NTE
BFS
MAD
BCN
TLS
BOD
LIN
MPL
ZRH
DUS
VIE
LYS
BOD
SXF
CTA
BSL

Typical Crew duty | LGW-AMS | AMS-LGW | LGW-MAD | MAD-LGW

The variability of routine, everyday flights





- Multiple agencies

Airport Environment
- Apron Ctrl
- Aerodrome Ctrl
- Approach / Radar Ctrl

Terminal Environment
- Multiple sectors (Lateral / Vertical)

Enroute Environment
- Multiple sectors (Lateral / Vertical)
- Multiple ACCs
- Multiple FIR/UIR

View from the cockpit

Variability - Some examples

- Different agencies can mean different local procedures and expectations:
  - Departure in London TMA

Callsign
SID
Passing Level
Local Procedure Cleared Level

  - Departure in Amsterdam Schiphol

Local Procedure At 2000ft transfer to departure:
Callsign
Altitude
SID

  - Arrival into Amsterdam TMA

On initial contact:
- with APCH/ARR report call-sign only
- with TWR report call-sign and RWY
Local Procedure Contact GND (without ATC instructions) immediately after vacating RWY

  - Arrival into London TMA

Position
Level / Cleared Level
Local Procedure Expected STAR

Different local solutions – Speed Control

– Approach speed control

LGW
220kt – From HLDG facility
180kt – On base leg / closing HDG to ILS
180-160kt – On ILS then 160kt to 4nm

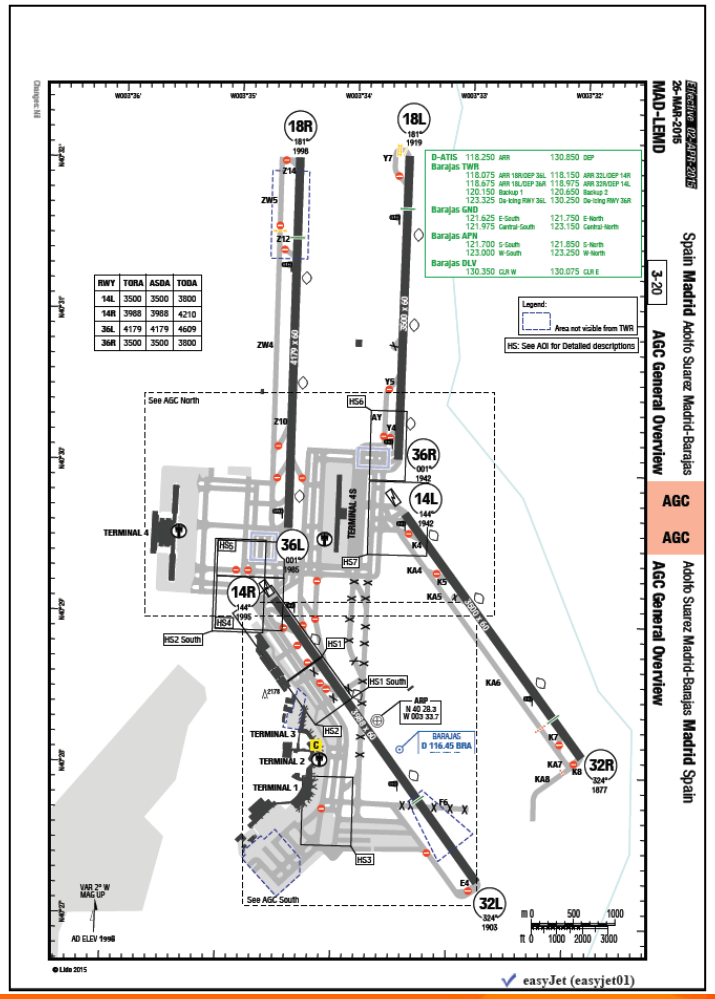
AMS
220kt – From 15 DME / HLDG facility
Reductions below 220kt by ATC
160kts – On ILS to 4nm

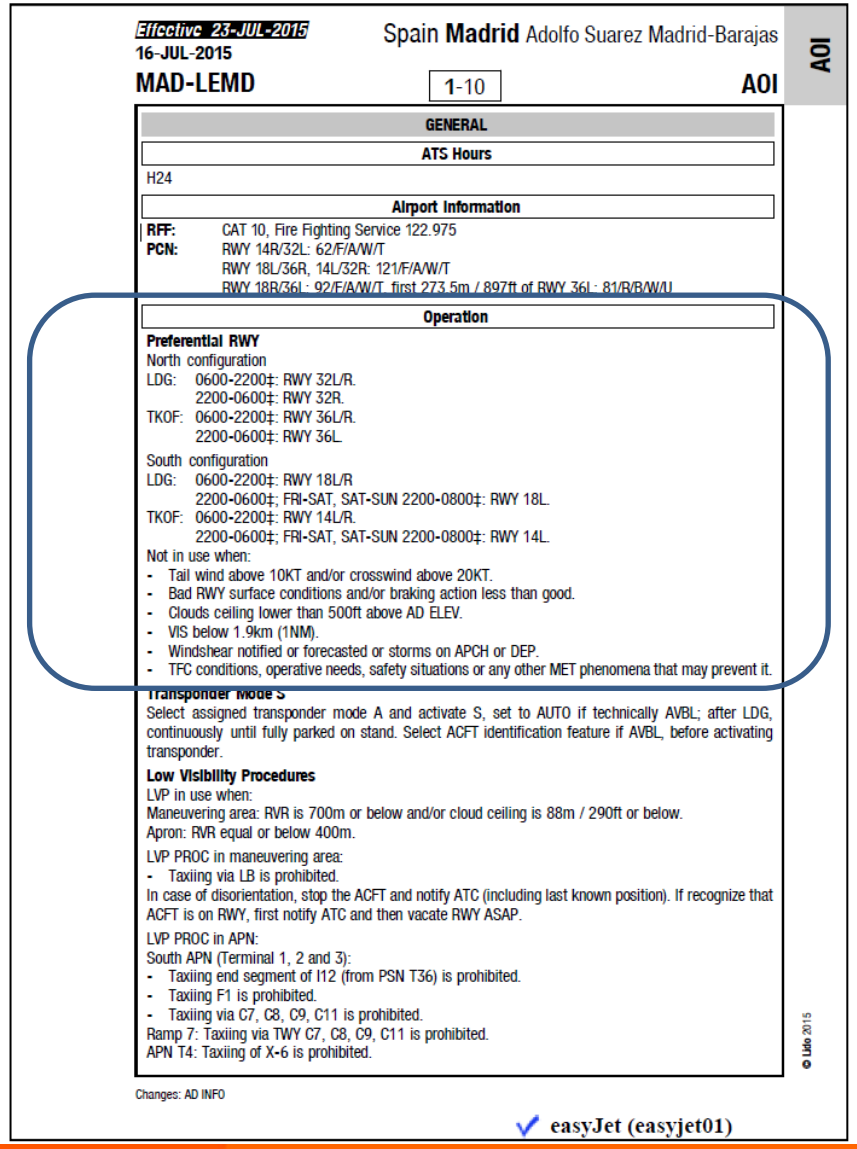
MAD
220kt – At the IAF
200kt – On ILS LOC intercept
160kt – At 6nm to 4nm

170kt – Until 5nm
165kt – Until 4nm
160kt – Until 5nm

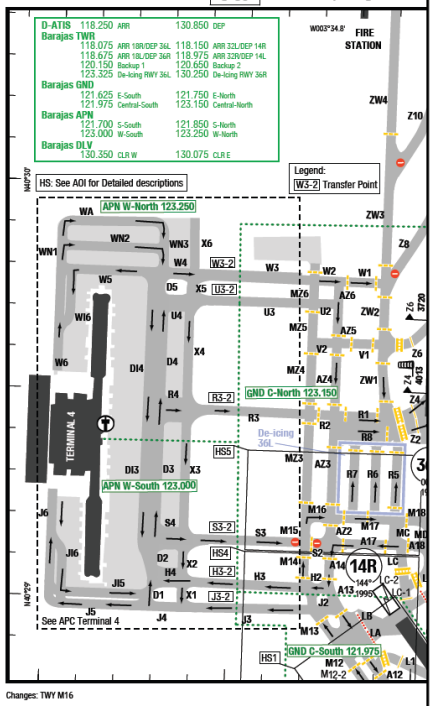
Variability and complexity

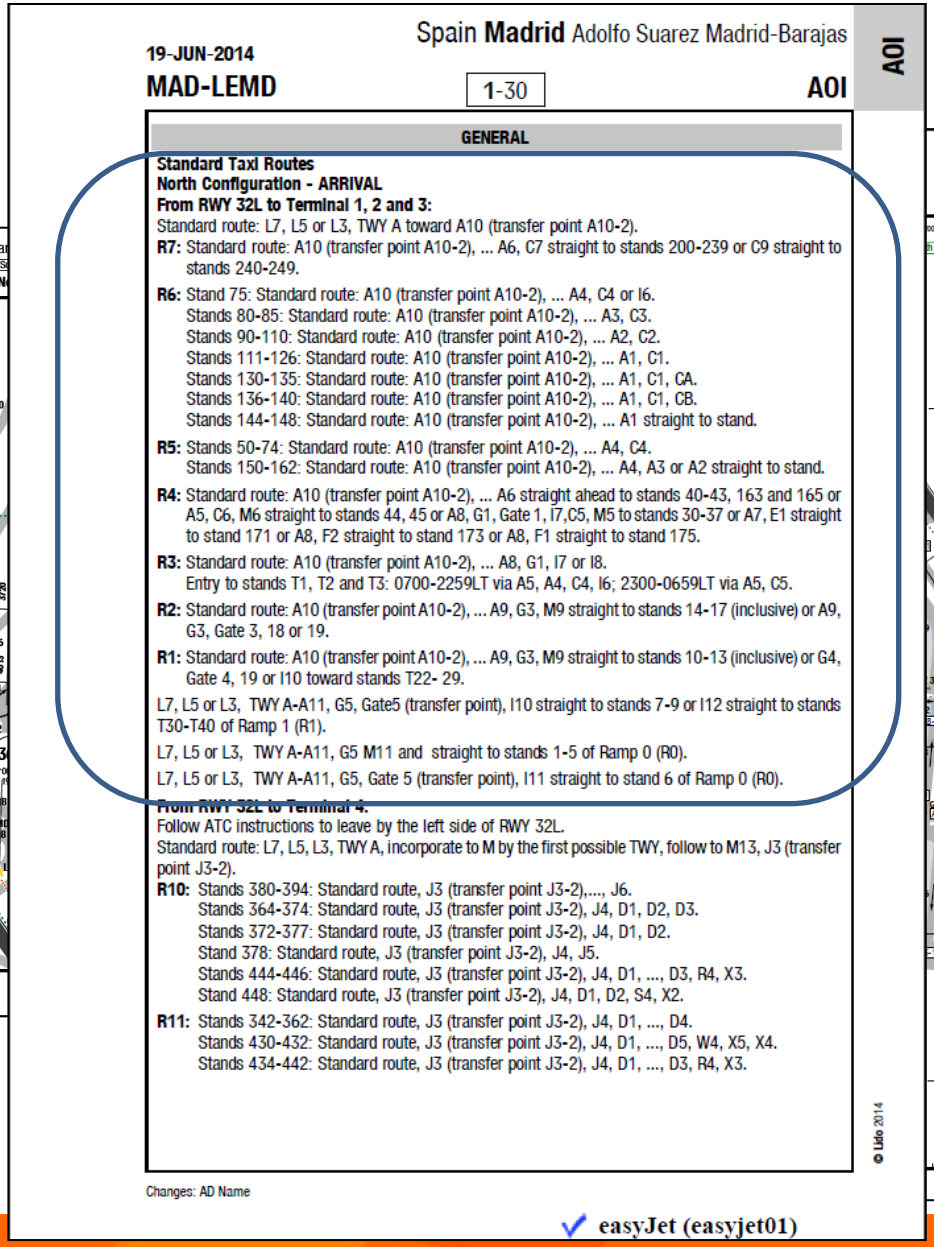
– Runway utilisation





Complexity


13-AUG-2015
MAD-LEMD
3-30
AGC North (Configuration
D-ATIS 118.250 ARR 130.850 DEP
Barajas TWR 118.075 ARR 18R/DEP 36L 118.150 ARR 22L/DEP 14R
118.675 ARR 18L/DEP 36R 118.975 ARR 22R/DEP 14L
120.150 Backup 1 120.650 Backup 2
123.325 De-Icing RWY 36L 130.250 De-Icing RWY 36R
Barajas GND 121.625 E-South 121.750 E-North
121.975 Central-South 123.150 Central-North
Barajas APN 121.700 S-South 121.850 S-North
123.000 W-South 123.250 W-North
Barajas DLV 130.350 CLR W 130.075 CLR E
HS: See AOI for Detailed descriptions
Legend: W3-2 Transfer Point
FIRE STATION
APN W-North 123.250
APN W-South 123.000
GND C-North 123.150
GND C-South 121.975
De-icing 36L
TERMINAL 4
14R
See APC Terminal 4
Changes: TWY M16


Spain Madrid Adolfo Suarez Madrid-Barajas
AOI
19-JUN-2014
MAD-LEMD
1-30
AOI
GENERAL
Standard Taxi Routes
North Configuration - ARRIVAL
From RWY 32L to Terminal 1, 2 and 3:
Standard route: L7, L5 or L3, TWY A toward A10 (transfer point A10-2).
R7: Standard route: A10 (transfer point A10-2), ... A6, C7 straight to stands 200-239 or C9 straight to stands 240-249.
R6: Stand 75: Standard route: A10 (transfer point A10-2), ... A4, C4 or I6.
Stands 80-85: Standard route: A10 (transfer point A10-2), ... A3, C3.
Stands 90-110: Standard route: A10 (transfer point A10-2), ... A2, C2.
Stands 111-126: Standard route: A10 (transfer point A10-2), ... A1, C1.
Stands 130-135: Standard route: A10 (transfer point A10-2), ... A1, C1, CA.
Stands 136-140: Standard route: A10 (transfer point A10-2), ... A1, C1, CB.
Stands 144-148: Standard route: A10 (transfer point A10-2), ... A1 straight to stand.
R5: Stands 50-74: Standard route: A10 (transfer point A10-2), ... A4, C4.
Stands 150-162: Standard route: A10 (transfer point A10-2), ... A4, A3 or A2 straight to stand.
R4: Standard route: A10 (transfer point A10-2), ... A6 straight ahead to stands 40-43, 163 and 165 or A5, C6, M6 straight to stands 44, 45 or A8, G1, Gate 1, I7,C5, M5 to stands 30-37 or A7, E1 straight to stand 171 or A8, F2 straight to stand 173 or A8, F1 straight to stand 175.
R3: Standard route: A10 (transfer point A10-2), ... A8, G1, I7 or I8.
Entry to stands T1, T2 and T3: 0700-2259LT via A5, A4, C4, I6; 2300-0659LT via A5, C5.
R2: Standard route: A10 (transfer point A10-2), ... A9, G3, M9 straight to stands 14-17 (inclusive) or A9, G3, Gate 3, 18 or 19.
R1: Standard route: A10 (transfer point A10-2), ... A9, G3, M9 straight to stands 10-13 (inclusive) or G4, Gate 4, 19 or I10 toward stands T22- 29.
L7, L5 or L3, TWY A-A11, G5, Gate5 (transfer point), I10 straight to stands 7-9 or I12 straight to stands T30-T40 of Ramp 1 (R1).
L7, L5 or L3, TWY A-A11, G5 M11 and straight to stands 1-5 of Ramp 0 (R0).
L7, L5 or L3, TWY A-A11, G5, Gate 5 (transfer point), I11 straight to stand 6 of Ramp 0 (R0).
From RWY 32L to Terminal 4:
Follow ATC instructions to leave by the left side of RWY 32L.
Standard route: L7, L5, L3, TWY A, incorporate to M by the first possible TWY, follow to M13, J3 (transfer point J3-2).
R10: Stands 380-394: Standard route, J3 (transfer point J3-2),..., J6.
Stands 364-374: Standard route, J3 (transfer point J3-2), J4, D1, D2, D3.
Stands 372-377: Standard route, J3 (transfer point J3-2), J4, D1, D2.
Stand 378: Standard route, J3 (transfer point J3-2), J4, J5.
Stands 444-446: Standard route, J3 (transfer point J3-2), J4, D1, ..., D3, R4, X3.
Stand 448: Standard route, J3 (transfer point J3-2), J4, D1, D2, S4, X2.
R11: Stands 342-362: Standard route, J3 (transfer point J3-2), J4, D1, ..., D4.
Stands 430-432: Standard route, J3 (transfer point J3-2), J4, D1, ..., D5, W4, X5, X4.
Stands 434-442: Standard route, J3 (transfer point J3-2), J4, D1, ..., D3, R4, X3.
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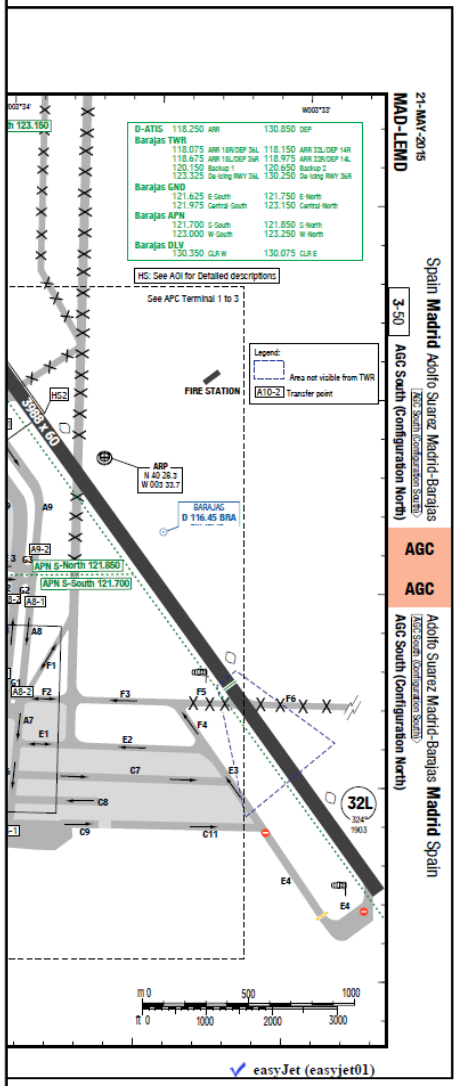
Changes: AD Name
easyJet (easyjet01)


21-MAY-2015
MAD-LEMD
3-50
Spain Madrid Adolfo Suarez Madrid-Barajas
AGC South (Configuration North)
AGC
AGC
D-ATIS 118.250 ARR 130.850 DEP
Barajas TWR 118.075 ARR 18R/DEP 36L 118.150 ARR 22L/DEP 14R
118.675 ARR 18L/DEP 36R 118.975 ARR 22R/DEP 14L
120.150 Backup 1 120.650 Backup 2
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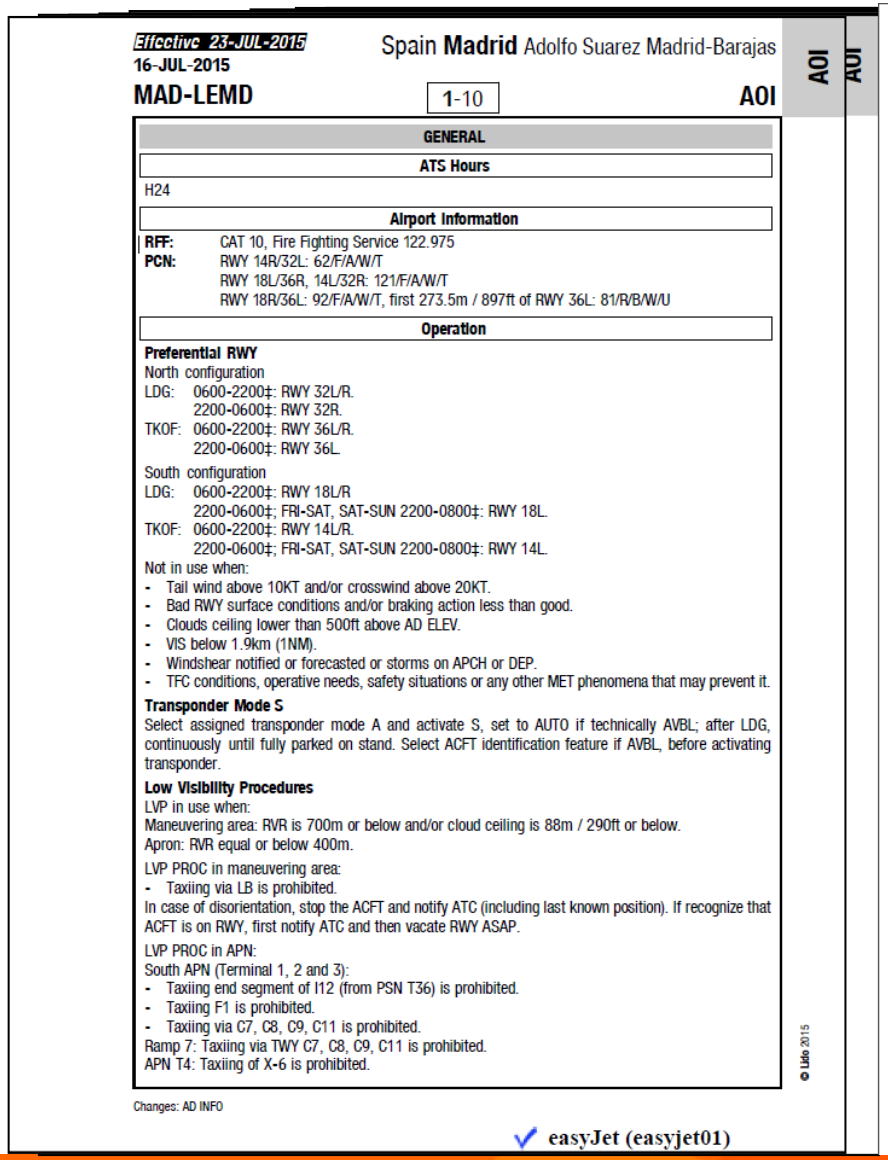
121.975 Central-South 123.150 Central-North
Barajas APN 121.700 S-South 121.850 S-North
123.000 W-South 123.250 W-North
Barajas DLV 130.350 CLR W 130.075 CLR E
HS: See AOI for Detailed descriptions
See APC Terminal 1 to 3
Legend: Area not visible from TWR
A10-2 Transfer point
FIRE STATION
ARP N 40 26.3 W 003 33.7
BARAJAS D 116.45 BRA
APN S-North 121.850
APN S-South 121.700
32L
m 0 500 1000
ft 0 1000 2000 3000
easyJet (easyjet01)

Complexity



Effective 23-JUL-2015
16-JUL-2015

Spain **Madrid** Adolfo Suarez Madrid-Barajas

AOI AOI

MAD-LEMD 1-10 **AOI**

GENERAL

ATS Hours

H24

Airport Information

RFF: CAT 10, Fire Fighting Service 122.975
PCN: RWY 14R/32L: 62/F/A/W/T
RWY 18L/36R, 14L/32R: 121/F/A/W/T
RWY 18R/36L: 92/F/A/W/T, first 273.5m / 897ft of RWY 36L: 81/R/B/W/U

Operation

Preferential RWY
North configuration
LDG: 0600-2200‡: RWY 32L/R.
2200-0600‡: RWY 32R.
TKOF: 0600-2200‡: RWY 36L/R.
2200-0600‡: RWY 36L.

South configuration
LDG: 0600-2200‡: RWY 18L/R
2200-0600‡; FRI-SAT, SAT-SUN 2200-0800‡: RWY 18L.
TKOF: 0600-2200‡: RWY 14L/R.
2200-0600‡; FRI-SAT, SAT-SUN 2200-0800‡: RWY 14L.

Not in use when:
- Tail wind above 10KT and/or crosswind above 20KT.
- Bad RWY surface conditions and/or braking action less than good.
- Clouds ceiling lower than 500ft above AD ELEV.
- VIS below 1.9km (1NM).
- Windshear notified or forecasted or storms on APCH or DEP.
- TFC conditions, operative needs, safety situations or any other MET phenomena that may prevent it.

Transponder Mode S
Select assigned transponder mode A and activate S, set to AUTO if technically AVBL; after LDG, continuously until fully parked on stand. Select ACFT identification feature if AVBL, before activating transponder.

Low Visibility Procedures
LVP in use when:
Maneuvering area: RVR is 700m or below and/or cloud ceiling is 88m / 290ft or below.
Apron: RVR equal or below 400m.

LVP PROC in maneuvering area:
- Taxiing via LB is prohibited.

In case of disorientation, stop the ACFT and notify ATC (including last known position). If recognize that ACFT is on RWY, first notify ATC and then vacate RWY ASAP.

LVP PROC in APN:
South APN (Terminal 1, 2 and 3):
- Taxiing end segment of I12 (from PSN T36) is prohibited.
- Taxiing F1 is prohibited.
- Taxiing via C7, C8, C9, C11 is prohibited.

Ramp 7: Taxiing via TWY C7, C8, C9, C11 is prohibited.
APN T4: Taxiing of X-6 is prohibited.

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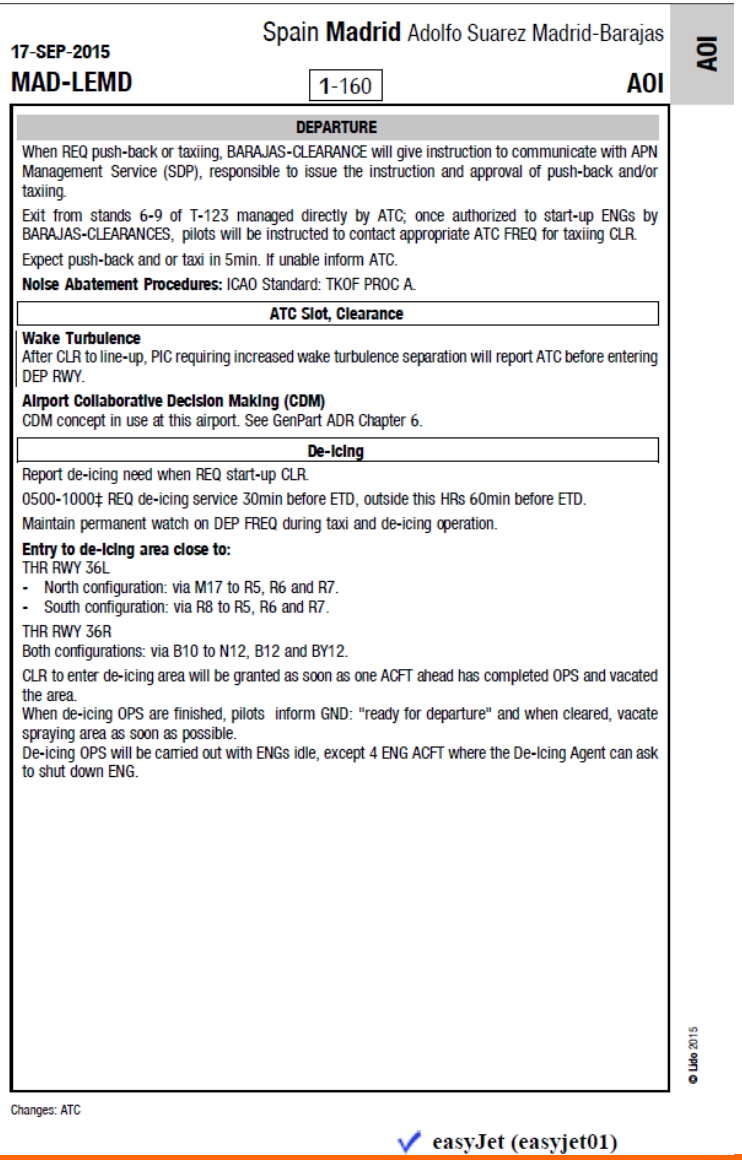
Changes: AD INFO

easyJet (easyjet01)



17-SEP-2015

Spain **Madrid** Adolfo Suarez Madrid-Barajas

MAD-LEMD 1-160 **AOI** AOI

DEPARTURE

When REQ push-back or taxiing, BARAJAS-CLEARANCE will give instruction to communicate with APN Management Service (SDP), responsible to issue the instruction and approval of push-back and/or taxiing.

Exit from stands 6-9 of T-123 managed directly by ATC; once authorized to start-up ENGs by BARAJAS-CLEARANCES, pilots will be instructed to contact appropriate ATC FREQ for taxiing CLR.

Expect push-back and or taxi in 5min. If unable inform ATC.

Noise Abatement Procedures: ICAO Standard: TKOF PROC A.

ATC Slot, Clearance

Wake Turbulence
After CLR to line-up, PIC requiring increased wake turbulence separation will report ATC before entering DEP RWY.

Airport Collaborative Decision Making (CDM)
CDM concept in use at this airport. See GenPart ADR Chapter 6.

De-icing

Report de-icing need when REQ start-up CLR.

0500-1000‡ REQ de-icing service 30min before ETD, outside this HRs 60min before ETD.

Maintain permanent watch on DEP FREQ during taxi and de-icing operation.

Entry to de-icing area close to:
THR RWY 36L
- North configuration: via M17 to R5, R6 and R7.
- South configuration: via R8 to R5, R6 and R7.

THR RWY 36R
Both configurations: via B10 to N12, B12 and BY12.

CLR to enter de-icing area will be granted as soon as one ACFT ahead has completed OPS and vacated the area.
When de-icing OPS are finished, pilots inform GND: "ready for departure" and when cleared, vacate spraying area as soon as possible.
De-icing OPS will be carried out with ENGs idle, except 4 ENG ACFT where the De-Icing Agent can ask to shut down ENG.

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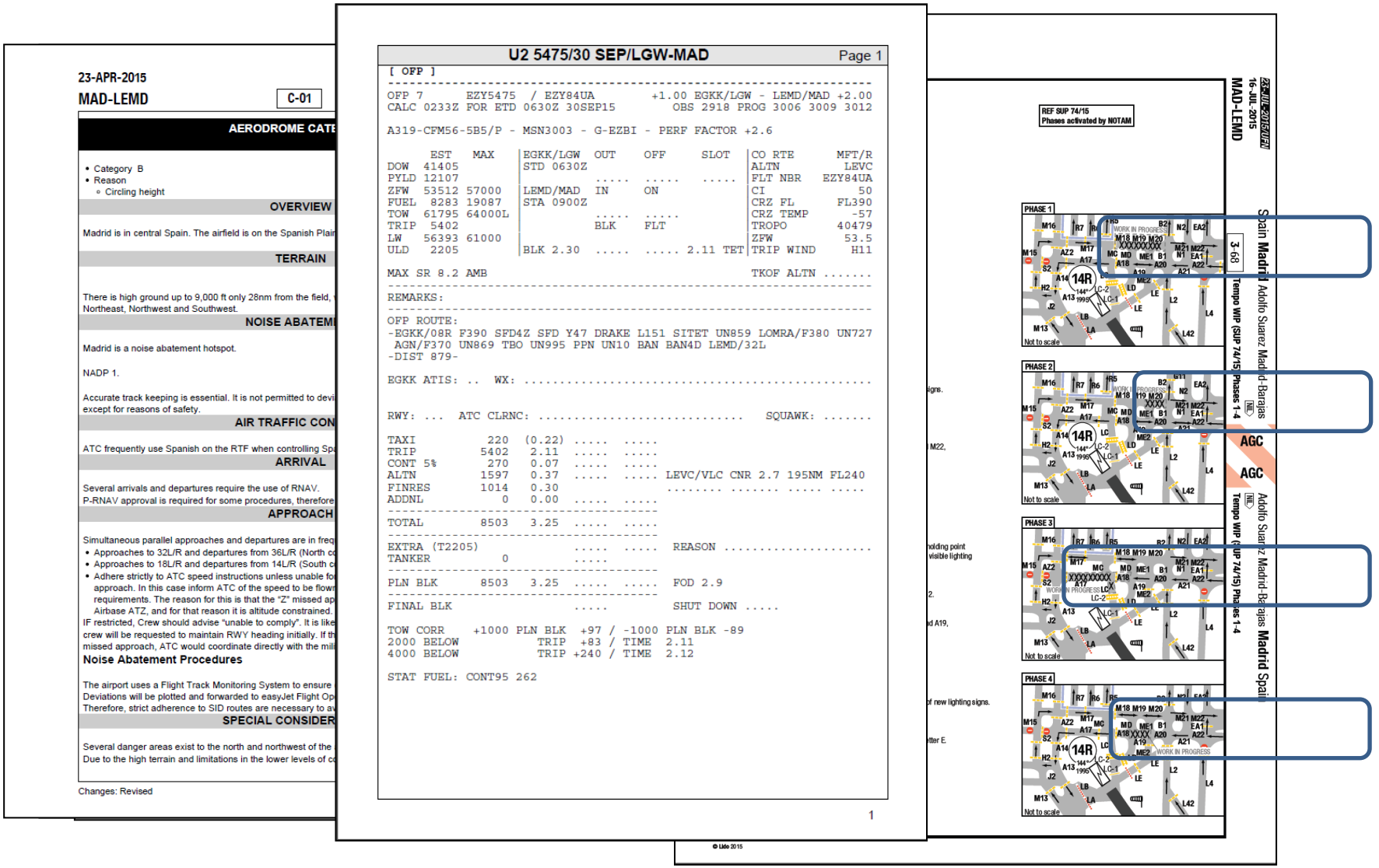
Changes: ATC

easyJet (easyjet01)

Complexity



23-APR-2015

MAD-LEMD C-01

AERODROME CATE

- Category B
- Reason
  - Circling height

OVERVIEW

Madrid is in central Spain. The airfield is on the Spanish Plair

TERRAIN

There is high ground up to 9,000 ft only 28nm from the field, Northeast, Northwest and Southwest.

NOISE ABATEM

Madrid is a noise abatement hotspot.

NADP 1.

Accurate track keeping is essential. It is not permitted to devi except for reasons of safety.

AIR TRAFFIC CON

ATC frequently use Spanish on the RTF when controlling Sp

ARRIVAL

Several arrivals and departures require the use of RNAV. P-RNAV approval is required for some procedures, therefore

APPROACH

Simultaneous parallel approaches and departures are in freq

- Approaches to 32L/R and departures from 36L/R (North c
- Approaches to 18L/R and departures from 14L/R (South c
- Adhere strictly to ATC speed instructions unless unable fo approach. In this case inform ATC of the speed to be flow requirements. The reason for this is that the "Z" missed ap Airbase ATZ, and for that reason it is altitude constrained.

IF restricted, Crew should advise "unable to comply". It is like crew will be requested to maintain RWY heading initially. If th missed approach, ATC would coordinate directly with the mili

Noise Abatement Procedures

The airport uses a Flight Track Monitoring System to ensure Deviations will be plotted and forwarded to easyJet Flight Op Therefore, strict adherence to SID routes are necessary to av

SPECIAL CONSIDER

Several danger areas exist to the north and northwest of the Due to the high terrain and limitations in the lower levels of c

Changes: Revised

U2 5475/30 SEP/LGW-MAD Page 1

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[ OFP ]
-------------------------------------------------------------------------------
OFP 7      EZY5475  / EZY84UA        +1.00 EGKK/LGW - LEMD/MAD +2.00
CALC 0233Z FOR ETD 0630Z 30SEP15       OBS 2918 PROG 3006 3009 3012

A319-CFM56-5B5/P - MSN3003 - G-EZBI - PERF FACTOR +2.6

      EST   MAX   |EGKK/LGW  OUT    OFF     SLOT  |CO RTE      MFT/R
DOW  41405        |STD 0630Z                      |ALTN         LEVC
PYLD 12107        |          .....  .....  .....  |FLT NBR    EZY84UA
ZFW  53512 57000  |LEMD/MAD  IN     ON            |CI             50
FUEL  8283 19087  |STA 0900Z                      |CRZ FL       FL390
TOW  61795 64000L |          .....  .....         |CRZ TEMP      -57
TRIP  5402        |          BLK    FLT           |TROPO       40479
LW   56393 61000  |                               |ZFW          53.5
ULD   2205        |BLK 2.30  .....  ..... 2.11 TET|TRIP WIND     H11

MAX SR 8.2 AMB                                    TKOF ALTN .......
-------------------------------------------------------------------------------
REMARKS:
-------------------------------------------------------------------------------
OFP ROUTE:
-EGKK/08R F390 SFD4Z SFD Y47 DRAKE L151 SITET UN859 LOMRA/F380 UN727
 AGN/F370 UN869 TBO UN995 PPN UN10 BAN BAN4D LEMD/32L
-DIST 879-

EGKK ATIS: ..  WX: ..............................................


RWY: ...  ATC CLRNC: ..............................   SQUAWK: .......

TAXI          220  (0.22) .....  .....
TRIP         5402   2.11  .....  .....
CONT 5%       270   0.07  .....  .....
ALTN         1597   0.37  .....  ..... LEVC/VLC CNR 2.7 195NM FL240
FINRES       1014   0.30                ........ ....... ..... .....
ADDNL           0   0.00  .....  .....
-------------------------------------------------------------------------
TOTAL        8503   3.25  .....  .....
-------------------------------------------------------------------------
EXTRA (T2205)             .....  .....  REASON ......................
TANKER          0         .....
-------------------------------------------------------------------------
PLN BLK      8503   3.25  .....  .....  FOD 2.9
-------------------------------------------------------------------------
FINAL BLK                 .....         SHUT DOWN .....

TOW CORR    +1000 PLN BLK  +97 / -1000 PLN BLK -89
2000 BELOW          TRIP  +83 / TIME  2.11
4000 BELOW          TRIP +240 / TIME  2.12

STAT FUEL: CONT95 262
```

1

REF SUP 74/15
Phases activated by NOTAM

16 JUL 2015 MAD-LEMD Spain Madrid Adolfo Suarez Madrid-Barajas 3-68

PHASE 1

PHASE 2

PHASE 3

PHASE 4

Not to scale

AGC

AGC

Tempo WIP (SUP 74/15) Phases 1-4

Tempo WIP (SUP 74/15) Phases 1-4

Adolfo Suarez Madrid-Barajas Madrid Spain

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How can airlines and ANSPs establish a common picture of WAD?

Airport Safety Meetings

FLOPSC
LRST

ANSP Safety Meetings

e.g. NATS SPA

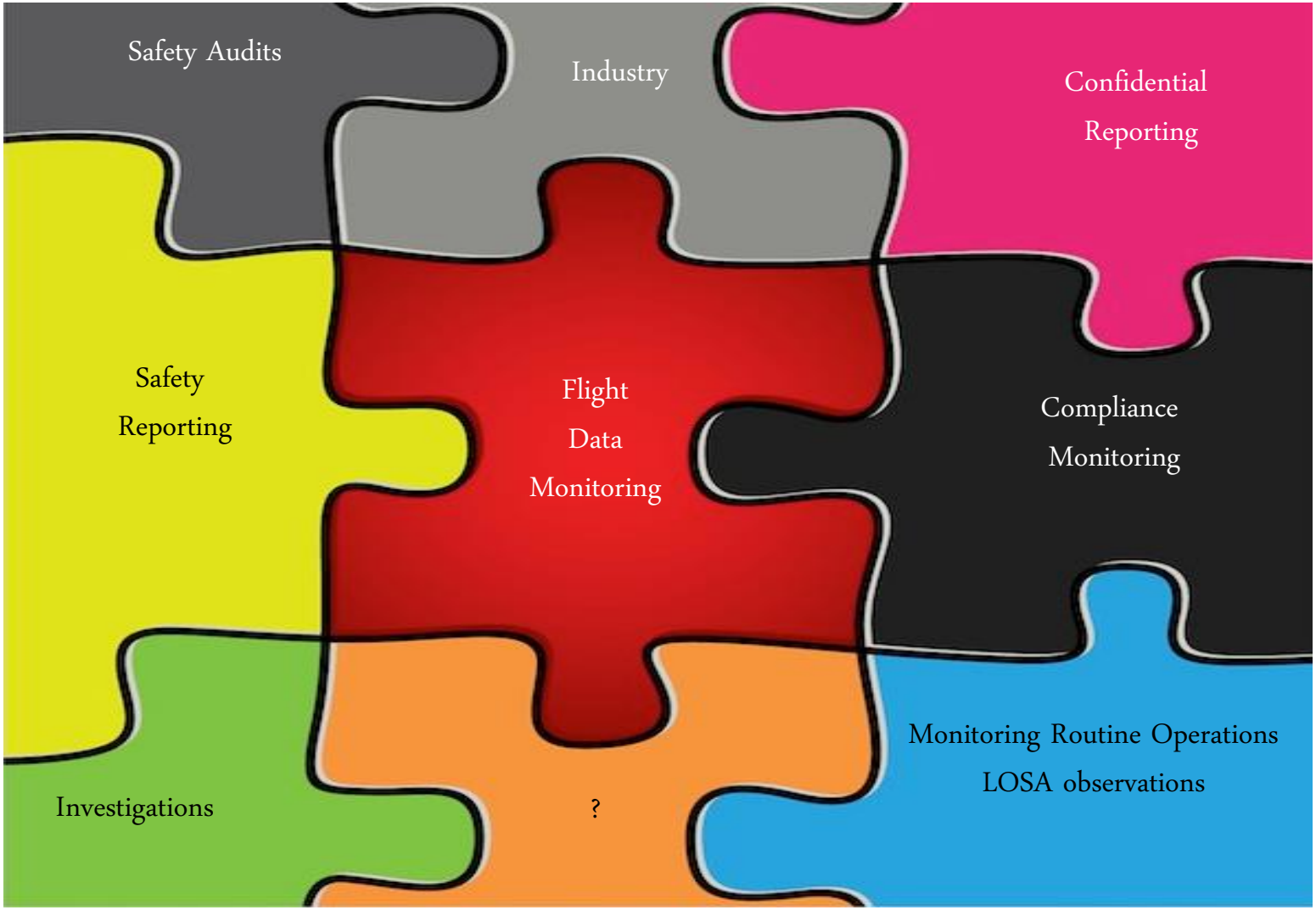
Controller / Pilot Training

Familiarisation
Joint training

National / International Safety Meetings

e.g. Eurocontrol Safety Conference

Taking a systems approach



Inadvertent parking brake application on pushback

Correct resting position for nose wheel

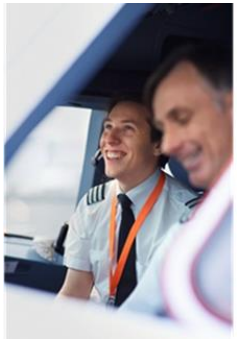
Fan cowl door loss on Airbus

Engine doors left 'unlatched' on the BA plane involved in last week's dramatic Heathrow emergency landing

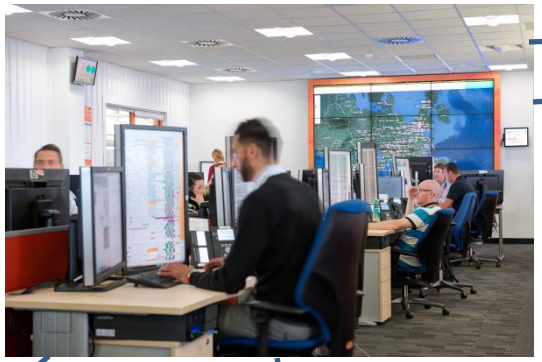
Emergency landing: The BA plane on the runway

Three months later…

Taking a systems approach



Taking a systems approach

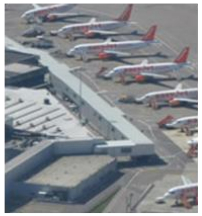


ATM




ANSPs

AIRPORTS



AIRLINES

MANUFACTURERS

Previous work has focused on measuring and establishing 'safety culture' across one domain

Future sky will look to establish the model across all relevant domains in the aviation system…

It will examine the issues pertaining to safety culture in each domain, and look at inter-dependencies across domains

"SAFETY CULTURE STACK"

Conclusions

- Work-As-Done is Work-As-Imagined until verified
- Airlines and ANSPs can better learn from each other by creating a dialogue about work-as-done
- Solutions at a local level, without systemised thinking, may introduce unwanted complexity
- A systems approach is needed to avoid working in silos

THANK YOU. ANY QUESTIONS?