

EASA FTL/FRM Workshop May 24th 2018

**Predictive Fatigue Tool at
European Air Transport Leipzig GmbH**

1. ABOUT EUROPEAN AIR TRANSPORT (EAT)

Airline:

- Located in Leipzig (LEJ), Germany
- 21 Airbus 300-600F; 9 Boeing 757-200 freighter
- One of the biggest cargo fleet in Europe
- About 830 employees including **250 pilots** and 310 aircraft mechanics

Flight Operations:

- Two bases: LEJ and BRU
- Avg start of duty btw 20:00 LT and 23:00 LT
- Avg end of duty btw 05:00 LT and 08:00 LT
- Avg 2.5 sectors per duty
- Serving European network
- Due to mainly night operations fatigue is a safety issue

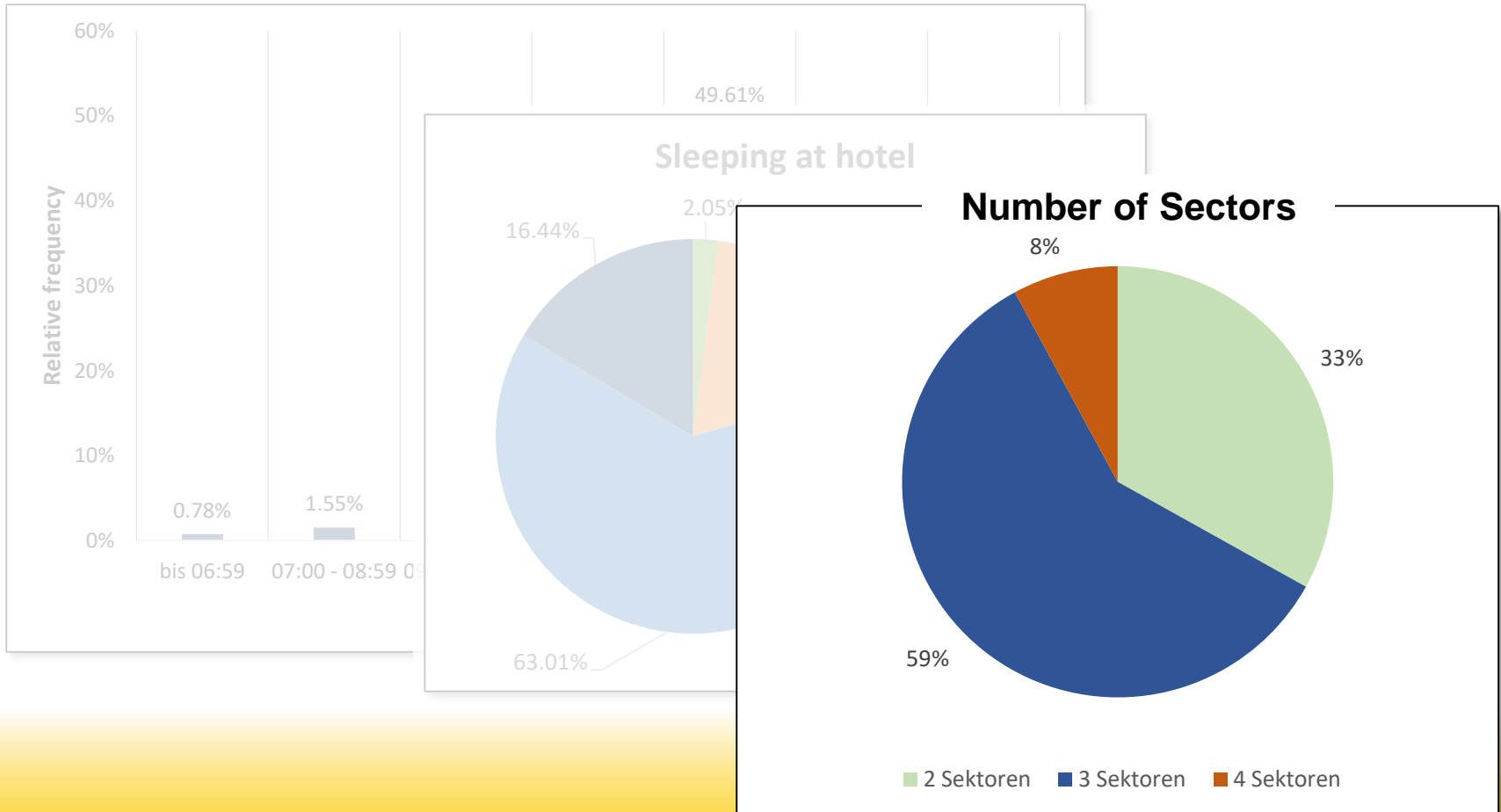
2. DIPLOMA THESIS & FATIGUE SURVEY

- One student from Technische Universität Dresden
- Task:
 - identify typical sleep patterns of our Pilots,
 - match it with scientific fatigue principles and
 - developing and calibrating a predictive FRMS tool
- Fatigue Survey for Flight Crews with 69! questions

- A. Sleeping at own facilities
- B. Sleeping on trip
- C. Sleep quality
- D. Duty and rest
- E. Workload
- F. Fatigue
- G. Current/ Last duty
- H. General

3. SURVEY RESULTS AND WEIGHTING

- participation of 66% → representative result



3. SURVEY RESULTS AND WEIGHTING

Cause of Fatigue	Fatigue factor	Limit/Indicator	Weighting
Sleep debt	previous sleep last 24hrs	- 5.5hrs - 4hrs	4.0
	previous sleep last 48hrs	11hrs	4.0
	sleep quality	day sleep	1.5
Wakefulness	time since awake	- 16hrs sleep during last 48hrs	4.0
	time on task	- 9hrs - 12hrs	4.0
Circadian factors	daytime	window of circadian low	3.5
	circadian disruption	rhythm change (day-night)	4.0
Workload	consecutive flights/sectors	3	2
Sleeping opportunity (SO) in UTC+1 and maximum time of sleep (max.)			
SO 1	SO 2	SO 3	SO 4
08:30-13:30 max. = 5hrs	22:00-08:00 max. = 8hrs	00:00-10:30 max. = 6.75hrs	07:00-14:30 max. = 5.5hrs
Additional Parameters		Value	
Time for transport		1hrs	
latest wake up before duty		3hrs	
Risk Area (Fatigue Score)			
risk area hazard	risk area 1 (fatigue hazard)	risk area 2 (increased fatigue hazard)	risk area 3 (fatigue hazard possible)
fatigue score	21 - 22.5	23 - 25	> 25.5

4. USAGE OF PREDICTIVE FTG TOOL

- Excel based Ftg tool which evaluates Flight Crew Schedules

11.3.6 Personal Crew Schedule

Starting Date: 01/03/2018 For 31 days

Base: ABZ All times in UTC Local Base

W/C type: CP

Crew Category: No be included

ID / Name:

Hours to be reported:

Other Statistics:

Sort Sequence: Base/CP/Pos/Name

Include indicators:

Extended: Address / Tel Hotel data Transfer info

Include following text in case of crew birthday:

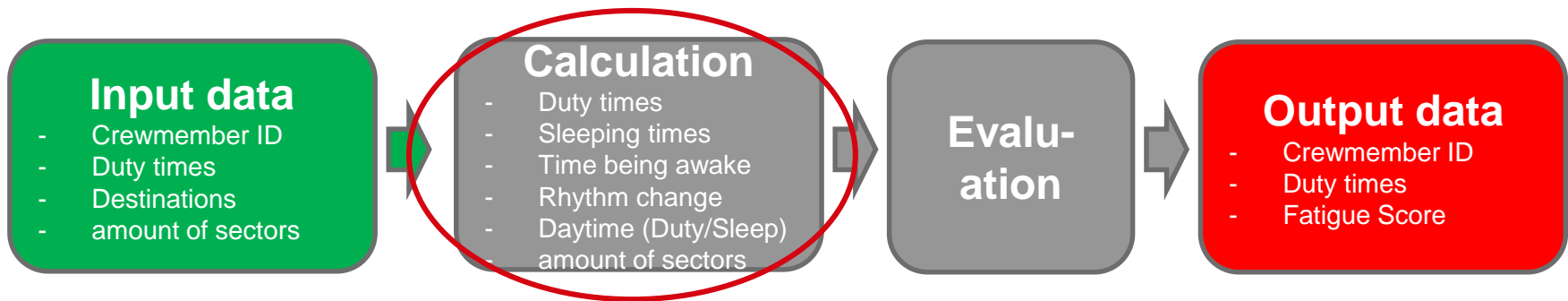
Comments:

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	A	B	C	D
1	931,04/01/2017,3:00,BRU,04/01/2017,7:4			
2	931,04/01/2017,20:55,TL5,04/01/2017,23			
3	931,06/01/2017,3:50,BRU,06/01/2017,9:4			
4	931,09/01/2017,18:10,MLA,10/01/2017,4			
5	931,17/01/2017,0:20,BRU,17/01/2017,6:4			
6	931,18/01/2017,2:25,LEJ,18/01/2017,7:43			
7	931,19/01/2017,18:45,LIS,20/01/2017,7:4			
8	931,20/01/2017,22:00,BRU,21/01/2017,7:4			
9	931,31/01/2017,3:50,BRU,31/01/2017,9:4			
10	836,01/01/2017,15:00,LEJ,01/01/2017,18:45			
11	836,10/01/2017,2:15,BRU,10/01/2017,7:4			
12	836,10/01/2017,18:45,LIS,11/01/2017,1:1			
13	836,11/01/2017,22:00,BRU,12/01/2017,6:4			
14	836,13/01/2017,23:50,BRU,14/01/2017,7:4			
15	836,16/01/2017,0:30,MAD,16/01/2017,6:4			
16	836,16/01/2017,18:45,LIS,17/01/2017,1:1			
17	836,24/01/2017,0:20,BRU,24/01/2017,6:4			
18	836,25/01/2017,2:25,LEJ,25/01/2017,7:43			
19	836,26/01/2017,18:45,LIS,27/01/2017,1:1			
20	704,02/01/2017,23:10,BRU,03/01/2017,6:4			
21	704,03/01/2017,21:00,BUD,04/01/2017,6:4			
22	704,04/01/2017,21:55,BLL,05/01/2017,3:4			
23	704,12/01/2017,3:50,BRU,12/01/2017,9:4			
24	704,13/01/2017,18:10,MLA,14/01/2017,4			

	A	B	C	D	E	F	G	H	I
1	index	ID (Crew Member)	On duty	Off duty	threshold 1	Risk-Level 1	Risk - Level 2	Risk - Level 3	all
2	388		5.1.17 19:25	6.1.17 6:15	29	29	29	29	29
3	505		31.1.17 19:25	1.2.17 8:45	25.5	25.5	25.5	25.5	25.5
4	6		15.1.17 22:00	16.1.17 6:00	23.5	23.5	23.5	23.5	23.5
5	117		9.1.17 21:30	10.1.17 5:50	23.5	23.5	23.5	23.5	23.5
6	147		9.1.17 21:55	10.1.17 9:30	25	25	25	25	25
7	201		2.1.17 21:45	3.1.17 8:25	23.5	23.5	23.5	23.5	23.5
8	319		7.1.17 22:00	8.1.17 6:00	23.5	23.5	23.5	23.5	23.5
9	336		19.1.17 22:00	20.1.17 6:00	23.5	23.5	23.5	23.5	23.5
10	356		2.1.17 21:30	3.1.17 6:30	25	25	25	25	25
11	377		9.1.17 21:50	10.1.17 6:05	23.5	23.5	23.5	23.5	23.5
12	399		24.1.17 21:00	25.1.17 6:20	25	25	25	25	25
13	416		9.1.17 21:50	10.1.17 6:20	23.5	23.5	23.5	23.5	23.5
14	465		16.1.17 21:30	17.1.17 6:30	25	25	25	25	25
15	515		26.1.17 19:25	27.1.17 6:05	25	25	25	25	25
16	4		12.1.17 21:00	13.1.17 6:00	21	21	21	21	21
17	7		17.1.17 2:25	17.1.17 8:25	21	21	21	21	21
18	15		2.1.17 20:55	3.1.17 7:45	21	21	21	21	21
19	51		10.1.17 21:00	11.1.17 6:10	21	21	21	21	21
20	63		6.1.17 19:45	7.1.17 4:30	21	21	21	21	21
21	66		18.1.17 22:00	19.1.17 8:45	21	21	21	21	21
22	67		19.1.17 19:45	20.1.17 6:10	21	21	21	21	21
23	89		2.1.17 21:00	3.1.17 6:00	21	21	21	21	21
24	101		9.1.17 20:55	10.1.17 7:45	21	21	21	21	21
25	111		25.1.17 20:55	26.1.17 7:45	21	21	21	21	21
26	165		23.1.17 21:55	24.1.17 8:25	21	21	21	21	21
27	168		3.1.17 21:00	4.1.17 6:05	21	21	21	21	21
28	174		16.1.17 20:55	17.1.17 6:05	21	21	21	21	21
29	189		30.1.17 21:00	31.1.17 6:00	21	21	21	21	21
30	256		4.1.17 0:20	4.1.17 9:50	21	21	21	21	21
31	267		13.1.17 21:55	14.1.17 7:10	21	21	21	21	21
32	287		16.1.17 21:00	17.1.17 6:20	21	21	21	21	21
33	320		8.1.17 23:20	9.1.17 4:05	21	21	21	21	21
34	329		4.1.17 21:00	5.1.17 6:30	21	21	21	21	21
35	337		20.1.17 23:10	21.1.17 7:10	21	21	21	21	21
36	347		19.1.17 21:30	20.1.17 7:45	21	21	21	21	21
37	361		11.1.17 21:00	12.1.17 6:10	21	21	21	21	21
38	368		24.1.17 21:50	25.1.17 6:00	21	21	21	21	21
39	417		10.1.17 21:55	11.1.17 6:05	21	21	21	21	21
40	423		23.1.17 21:30	24.1.17 6:20	21	21	21	21	21
41	428		5.1.17 21:00	6.1.17 6:00	21	21	21	21	21

4. USAGE OF PREDICTIVE FTG TOOL



	A	B	C	D	E	F	G	H	I
1	index	ID (Crew Member)	On duty	Off duty	threshold 1	Risk-Level 1	Risk - Level 2	Risk - Level 3	all
2	388	A A A	5.1.17 19:25	6.1.17 6:15	29	29	29	29	29
3	505	B B B	31.1.17 19:25	1.2.17 8:45	25.5	25.5	25.5	25.5	25.5
4	6	C C C	15.1.17 22:00	16.1.17 6:00	23.5	23.5	23.5	23.5	23.5
5	117	D D D	9.1.17 21:30	10.1.17 5:50	23.5	23.5	23.5	23.5	23.5
6	147	E E E	9.1.17 21:55	10.1.17 9:30	25	25	25	25	25
7	201	F F F	2.1.17 21:45	3.1.17 8:25	23.5	23.5	23.5	23.5	23.5
8	319	G G G	7.1.17 22:00	8.1.17 6:00	23.5	23.5	23.5	23.5	23.5
9	336	H H H	19.1.17 22:00	20.1.17 6:00	23.5	23.5	23.5	23.5	23.5
10	356	I I I	2.1.17 21:30	3.1.17 6:30	25	25	25	25	25
11	377	J J J	9.1.17 21:50	10.1.17 6:05	23.5	23.5	23.5	23.5	23.5
12	399	A A A	24.1.17 21:00	25.1.17 6:20	25	25	25	25	25
13	416	M M M	9.1.17 21:50	10.1.17 6:20	23.5	23.5	23.5	23.5	23.5
14	465	N N N	16.1.17 21:30	17.1.17 6:30	25	25	25	25	25
15	515	O O O	26.1.17 19:25	27.1.17 6:05	25	25	25	25	25
16	4	C C C	12.1.17 21:00	13.1.17 6:00	21	21	21	21	21
17	7	C C C	17.1.17 2:25	17.1.17 8:25	21	21	21	21	21

5. FRMS THREE STEP APPROACH

Reactive:

- Hazard analysis through **Fatigue Reports, Air Safety Reports, Investigations**

Proactive:

- Hazard identification by **Fatigue Alert Reports, Fatigue Survey, Fatigue SPI's**

Predictive:

- Hazard identification through **Fatigue tool** (analysis of planned duties)
- Data sharing with other DHL Airlines

F R M S

Improve Flight Safety

QUESTIONS

Thank you

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