FRAM & ATM

Report from a collaboration on the use of FRAM in the context of ATM
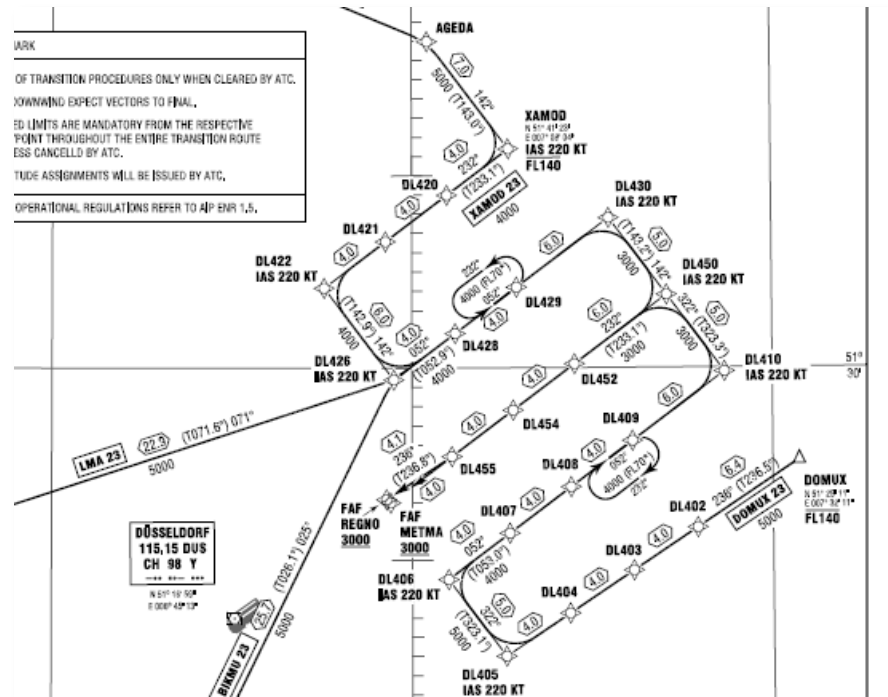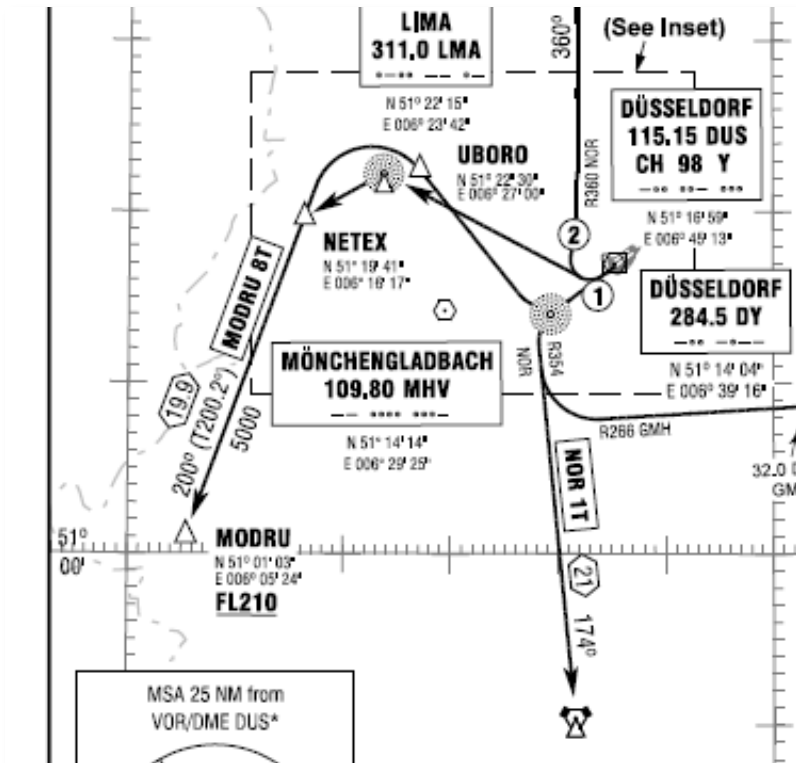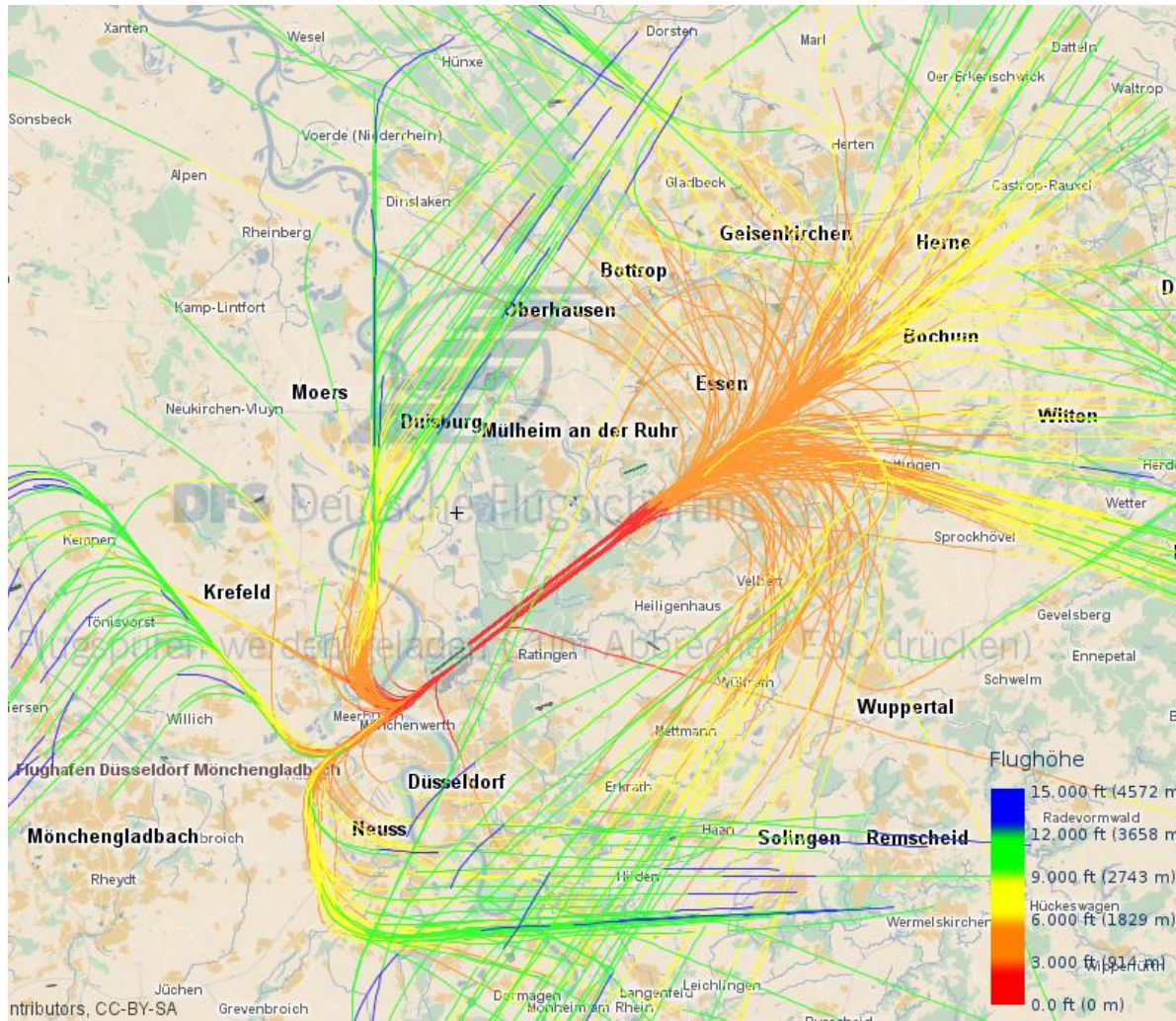
„The difference between theory and practise is greater in practise than in theory"

Work as imagined

Departure and Arrival Charts EDDL

and actually done…

Flight tracks on 22.04.2013 around EDDL

Imagined…

Actually done…

Even Erik…

Working on FRAM – the exercise
Erik Hollnagel   An: Bernd.Dieudonne, Franz.Kern…   27.01.2011 11:58
Details anzeigen

▼ 1 Anhang

FRAM_exercises.pdf

  Dear All,
It appears that the use of Google groups was not as simple as imagined
(nothing ever is).

Our starting point with the FRAM collaboration

- Group of HF experts and air traffic controllers from 3 different ANSPs (~15 people)

- 6 Workshops over 3 years

Introduction into key concepts and ideas…

- Resilience Engineering

- Performance Variability

- Tasks vs. functions

- How to assess the variability of the functions?

Also challenging:

- Thoughts on how to operationalize these concepts into the existing Safety Management System (SMS)

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Hands on FRAM (overflight)

- We started with the most "easiest imaginable" scenario: an overflight from A to B

- Set of 13 functions

- Labeling of functions not easy, e.g. *monitoring*

- "Breadth vs. depth"

1	Identifying of an aircraft
2	Monitoring
3	Separating aircraft
4	Transfering control of the aircraft
5	Issuing of ATC clearances
6	Update flight information to pilot
7	Strip marking
8	Coordination
9	Updating flight data
10	Updating radar data
11	Updating meteorological data
12	Issuing of traffic information
13	Providing of data

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And failed…

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The others were not luckier…

Function	Input	Output	Precondition	Time	Control	Resources
Radar Executive (RE)	Radar Planner, Strips, E-STCA Alarm, Aircrew, Adj, sect. coord. CWP, Current Met, Traffic Load, … .	Vectors for AC, Coordinations, CWP inputs, … ,	Sectorization, CWP status, Rostering, … .	Scanning, RT Comm., Tel Comm.. Coordination, E-STCA param., RE-RP coop., … . Time between output and reaction…, … ,	Procedures, Radar Planner, Strips (write CFL), FL restriction over MILP A (FL160-FL180), Routine (e.g. automatic descent release to FL210 for traffic BENOT-LFLL), … .	Time, CWP, Experience, Training, Interpersonal relations, … ,
Radar Planner (RP)	RE, Strips, Aircrew, Adj. sect. coord. Traffic load … ,	Proposed FL, Coordination: - RE, - Supervisor, - Adj. Sect., … .	Sectorization, CWP status, design, tools, Traffic load (for coordination with RE, … .	Scanning, Communication, Coordination, E-STCA Settings, … ,	Procedures, Radar Executive, Strips, Routine, … .	Time, Experience, Training, CWP, Interpersonal relations, … .
Met	… .	Met. Cond., Met. Forecast, … .	… .	… .	… .	… .

AVINOR

skyguide
swiss air navigation services ltd

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More theory necessary…
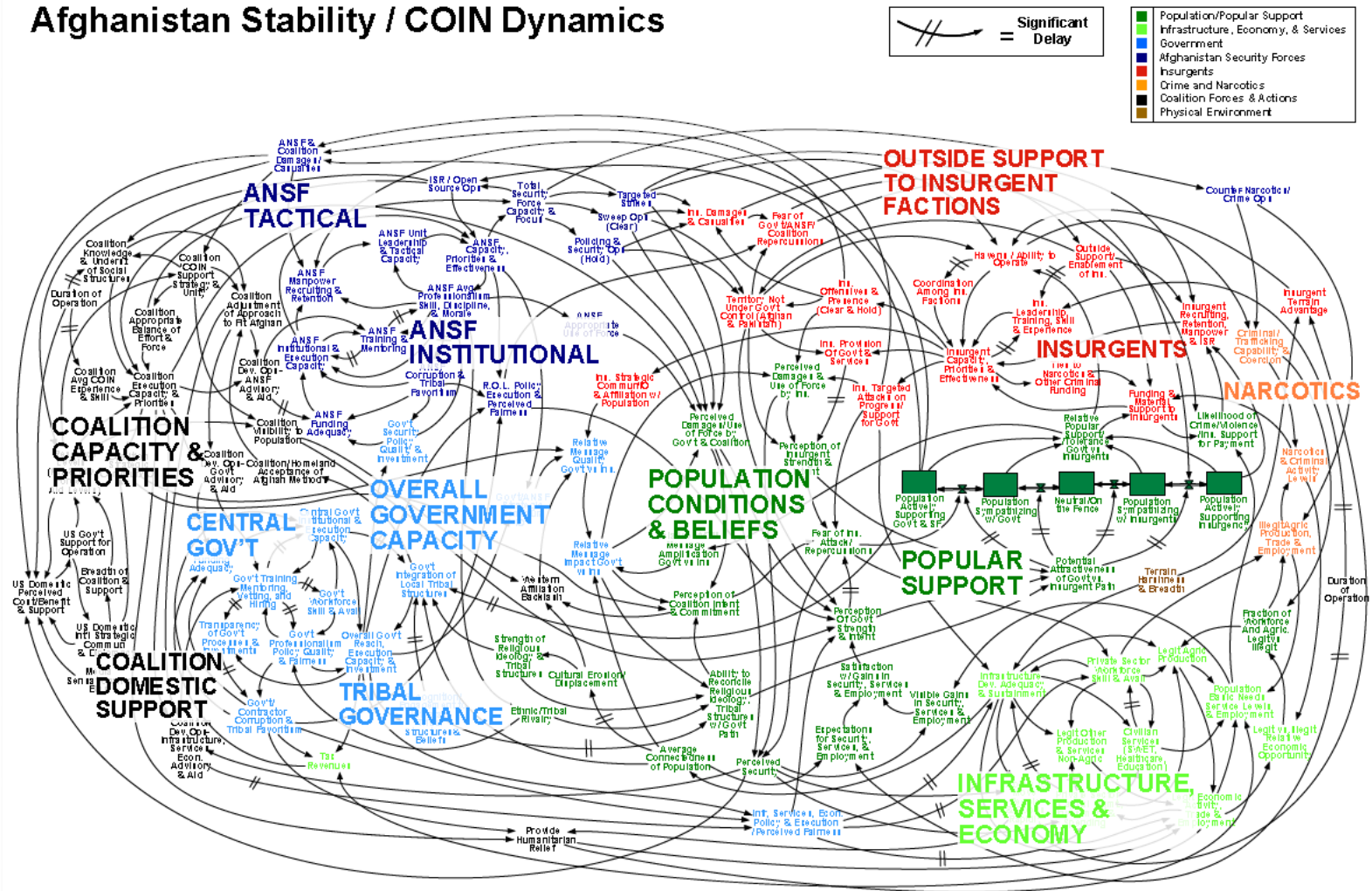
Input from Erik:

- Models/Graphics/Semantics

- FRAM: The Linate accident (step by step)

Discussion about incident investigation:

- What is the purpose?

- How to learn from incidents?

- What are the benefits?

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Where we ended up with…

Afghanistan Stability / COIN Dynamics

Where we *really* ended up with…

Frankenstein Castle

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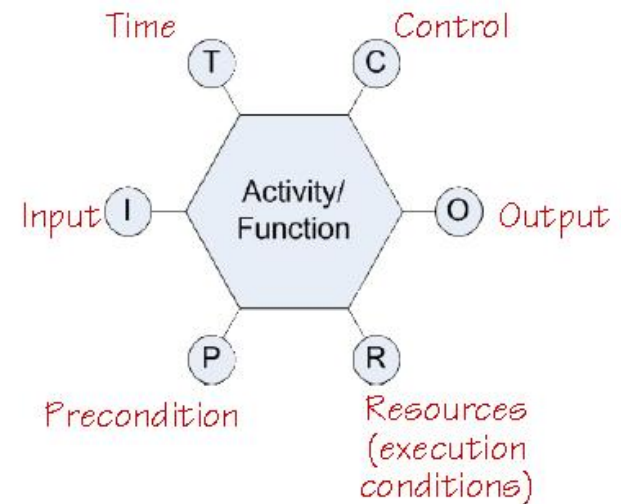
Hands on FRAM – More work on the functions

- What is a function?
- Identifications of the functions
- Excel sheet

SCOPE: Overflight scenario			
		Background Function	Foreground Function
FUNCTION TITLE	Identify		
FUNCTION DESCRIPTION			
INPUT (activates the function)	initial call acknowledged (recieved) flighplan verify flight plan data		
OUTPUT (the result)	aircraft identification acknowledged		
PRE-CONDITIONS (must be satisfied before a function can be carried out) (must be the output from another function/s)	communication establisehd (human-human)		

Hands on FRAM – Outlook on the next steps

- Potential variability of the functions

- Aggregation of the variability

- We started with the most simple imaginable scenario (overflight from A to B) but failed to move on

- Therefore, we tried to choose an incident as a starting point and orientation

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Incident investigation and FRAM

- Setting up a workable model (reference case from EDDF TWR)

- From the incident to the everyday scenario

- Variability (manifestation, aggregation)

- First contact with Safety I & Safety II

Case description (TWR-APP)

- During a very windy afternoon there was a shortage of supervisors in a control tower. The senior controller (PL3), who should normally take over these tasks was working in position. Because the amount of traffic was increasing (several go arounds and many aircraft with start up clearance given) the senior controller got a relief to issue flow control measures.

- Controller PL3 has to ask Controller PL1 for permission, in case he has a departure on a conflicting departure route. This was coordinated by PL3 A, - after Handover to PL3 B some information got lost. As a result, two aircraft received take off clearance and conflicted in the departure sector.

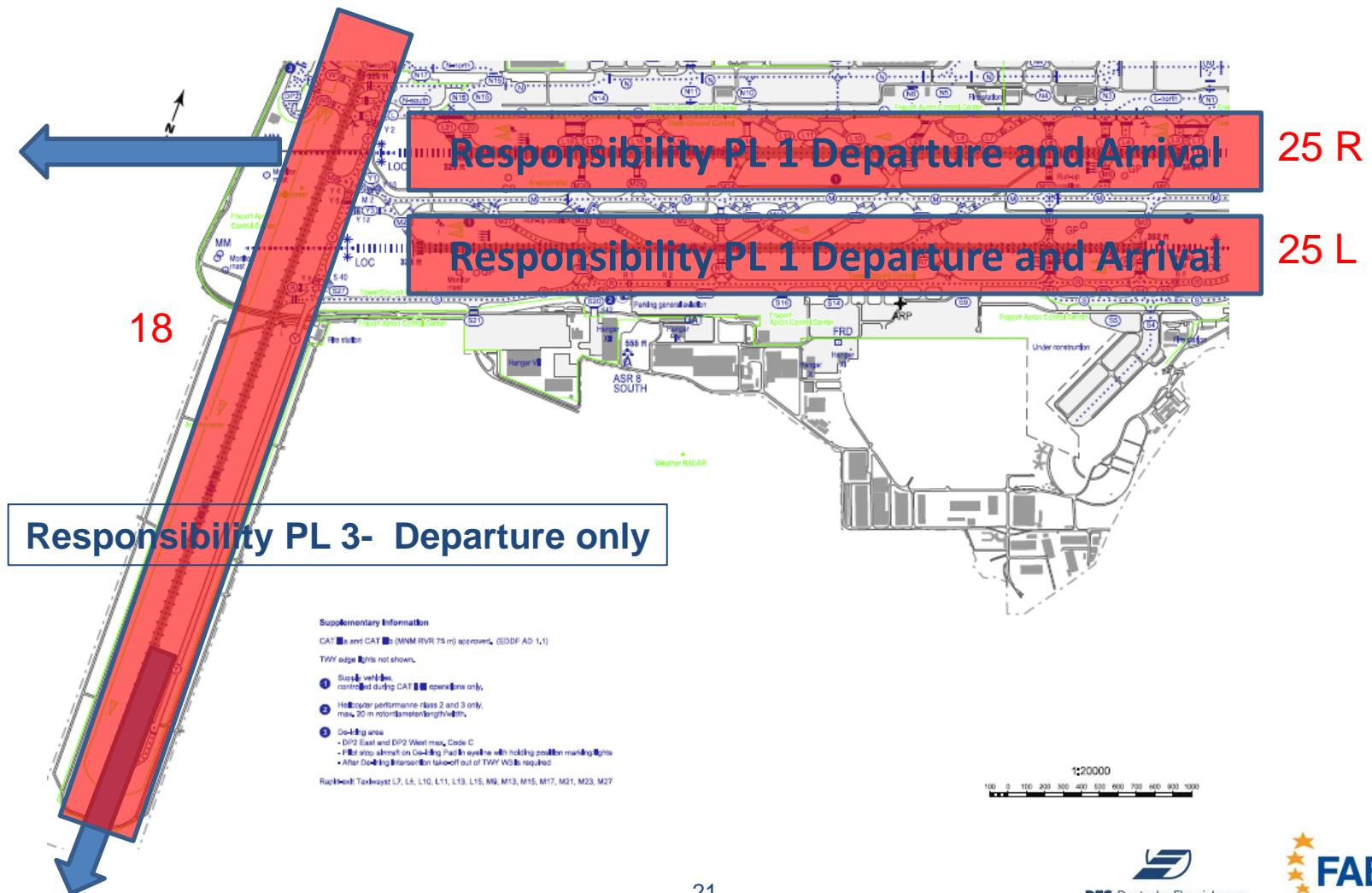- There was a high noise level in the control tower because of 14 people in the tower.

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What the investigation report mentioned…

- Severe weather-conditions (squall line)
- RWY 18 tailwind
- No Supervisor present (2 SV attended a meeting)
- Senior ATCO in position (instead of staffing SV Position)
- 38 inbounds per hour
- Startup given to 14 aircraft for RWY 25
- High noise level (14 staff member)
- Labeling squawk box (DEP – DFA2B)
- Distraction caused by calls of "Radar" and "Apron"
- PL3 was not aware of a second DEP
- Obscured visibility PL3 – PL1 by 14 People in TWR
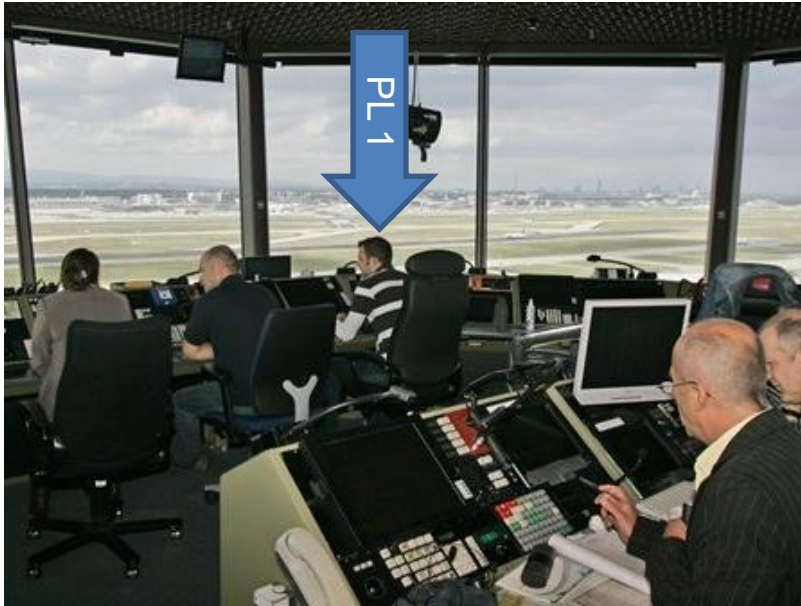- Transferring PL3 did not stay for tracing purposes

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Case description: TWR

Old Airport Layout

Responsibility PL 1 Departure and Arrival — 25 R

Responsibility PL 1 Departure and Arrival — 25 L

18

Responsibility PL 3- Departure only

Inside TWR

Inside TWR

SOBRA Departure

(See inset)
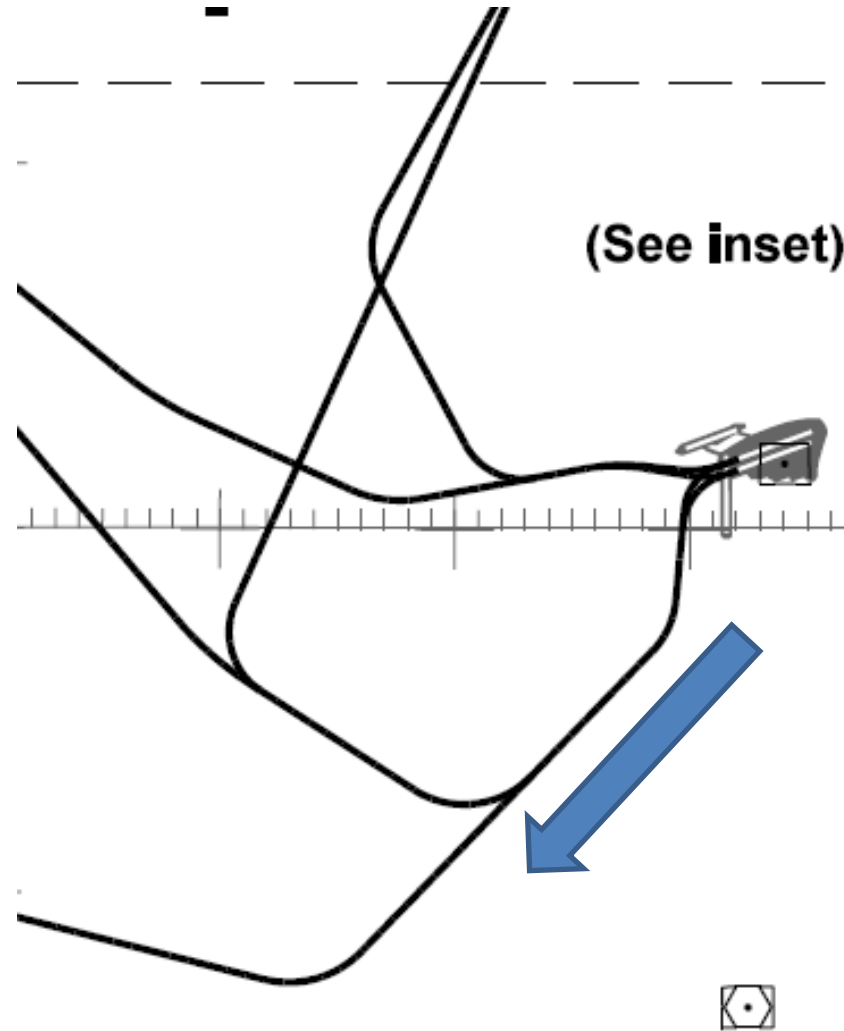
Departure Routes from RWY 25 and RWY 18

What we found…

- If we take an accident/incident, we always compare FRAM with our investigation report

- As we than can only reproduce the results we hardly see the incremental benefit of FRAM

- "Lost in details"

- We got **16 functions** and modeled only a very small part of the daily work

- Instantiation of the FRAM model for the "Herald" case consists only of **9 functions**

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Hands on FRAM (every day work)

- We decided to go back to the library of functions

- How did people from other fields moved on with FRAM? (Presentation of Jeanette Hounsgaard)

- Final set of functions for an overflight scenario (19 functions)

Function	I	O	P	R	C	T		
Update traffic picture	Traffic in sector	Updated traffic picture	Information about traffic	Traffic display	Separation standards			
	A/C entering sector	Anticipated conflict						
	Request from pilot	Need to sequence A/C						
	A/C leaving sector	Request						
	New assignment	Time estimate						
	A/C on vector	Task Prioritisation						

Interim conclusion

- What we found essential is how you name and connect the functions

- You have to specify a "stop-rule" *before* you start

- You need the support of some kind of visualization (e. g. flipcharts, Excel)

- You have define for yourself what you understand with the terms breadth and depth

Hands on FRAM (evaluation of a change)

- Artificial microworld

- Airspace, procedures, boundaries, etc. had to be defined

- Imagine a change in your microworld

- 2 groups (interviewers and interviewees)

What we didn´t imagine…

How we adapted…

- Proposal of 5 everyday scenarios (e. g. handover, request of a different FL, runway change)

- Interview session during the last WS

- How do we restructure the notes

- From statements to functions

- Evaluation the consequences of a change

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First set of functions for one specific scenario
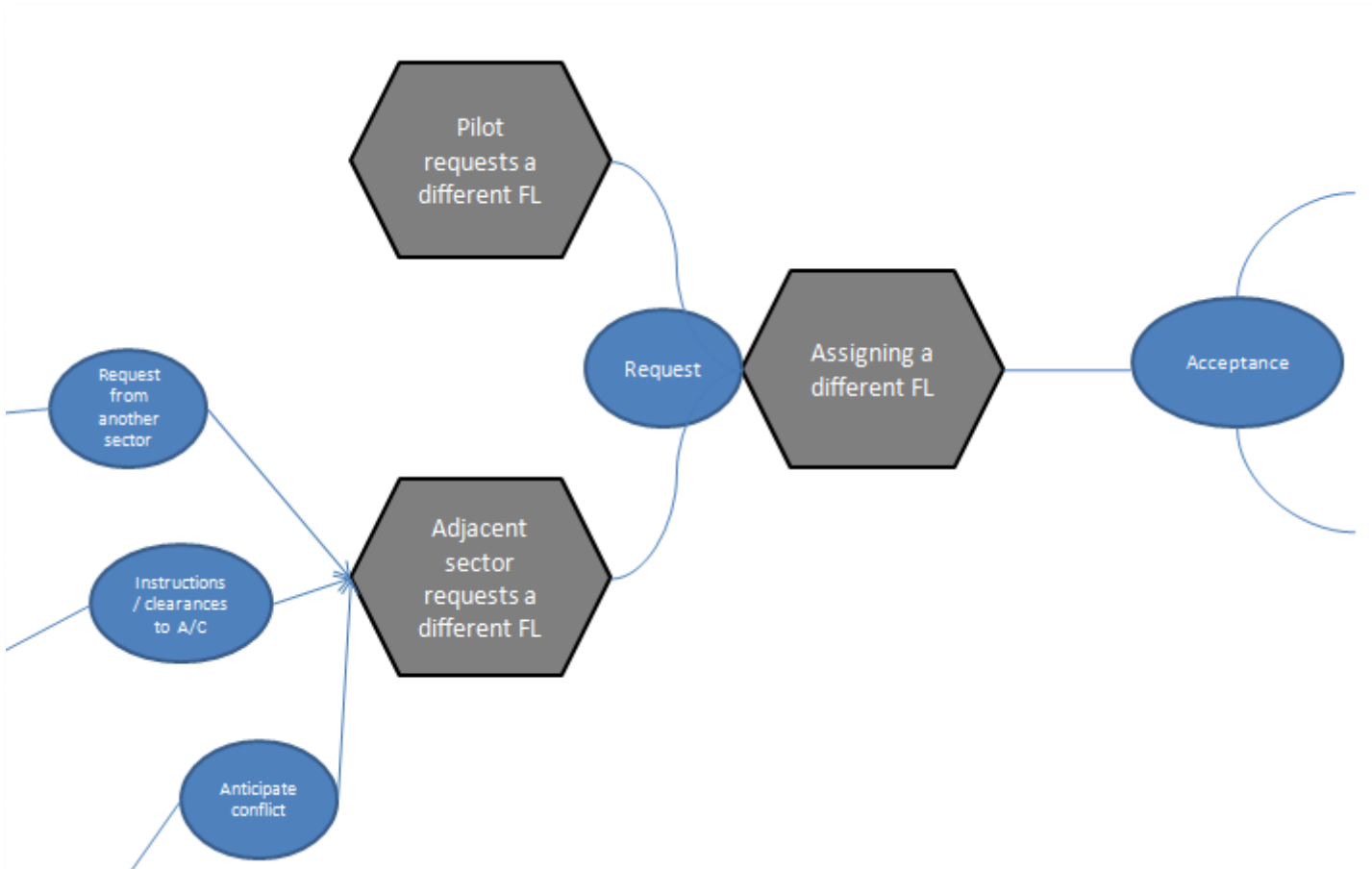
What was helpful…

- The interview situation provided a promising approach

- Operational knowledge essential

- Predefined roles

- Input by Erik

End.

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