

# “Weak Signals”

Lisboa

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**DFS** Deutsche Flugsicherung



# Before I start ...

- The more the conference advances the „adaptation pressure“ increases



# The view from behind



# How we adapted ...



**No „presenting zone“**

# Examples being used during the conference

**Electronic Briefing System**

No News for your branch!

docs for briefing 28

Mandatory Information

4(0 read) 24

EBS Release 1/2014  
Build 5.3.43-11.06.2014 (IE9)  
Optimized for 1280/1024  
© DFS – on behalf of OA/LD  
Developed by DFS-SH/BA

Your screen resolution:  
1280/800  
is not OK!!!

Öffnen Release -Docu

AIP(AFSBw) AIP(DFS) BA-FVD ELA-E NL-Mitte System-Handbooks

INFO: EBS-ePEP-Briefchek-Änderungen, INFO: EBS-V5.3-Benutzerhandb

# Introduction

*“The future seems implausible, the past incredible”*

(Woods & Cook, 2002)

# The Weak Signals project



- Project together with EUROCONTROL and TU Darmstadt
- Results will be made accessible via SKYbrary
- PREZI presentations



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT



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# Work Breakdown

WP 1     Scoping and Framework Definition

WP 2     Testing and Validation

WP 3     Communication, Training and Awareness

# Traditional Approach

- Use of after-the-event data to achieve an understanding about the organisation's safety level
- Safety is usually seen as the absence of unwanted consequences. The counteractions are therefore reactive and often influenced by hindsight
- Managing safety is seen as the avoidance or elimination of negative outcomes
- Organisations with this understanding may learn from past events, but hardly proactively anticipate future threats

# Characteristics of „Weak Signals“

- Low visibility
- Ambiguous, non-obvious
- Little or no familiarity
- Apparently low value
- Low apparent relevance and reliability
- Low palpability

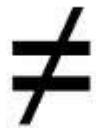
# Working Definition „Weak Signals“

“A seemingly random or disconnected piece of information that at first appears to be background noise but can be recognized as part of a significant pattern by viewing it through a different frame or connecting it with other pieces of information.”

(Schoemaker & Day, 2009)

# Weak signals versus indicators

weak signals



indicators

*vague*

Seemingly random  
disconnected  
ambiguous  
low visibility

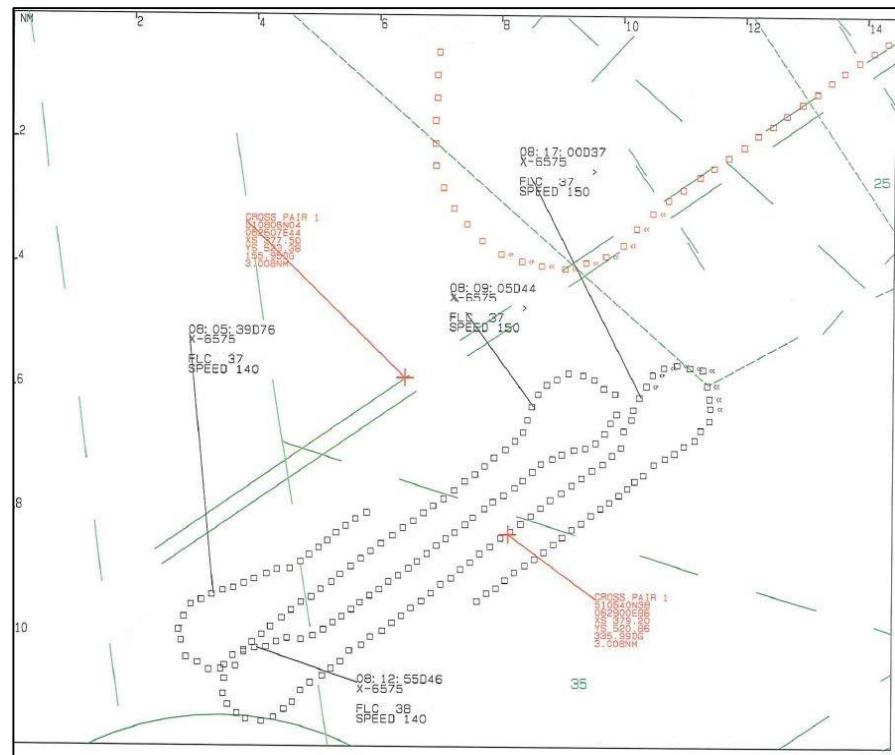
*clear*

Observable characteristic  
measurable/ operational  
**visible**

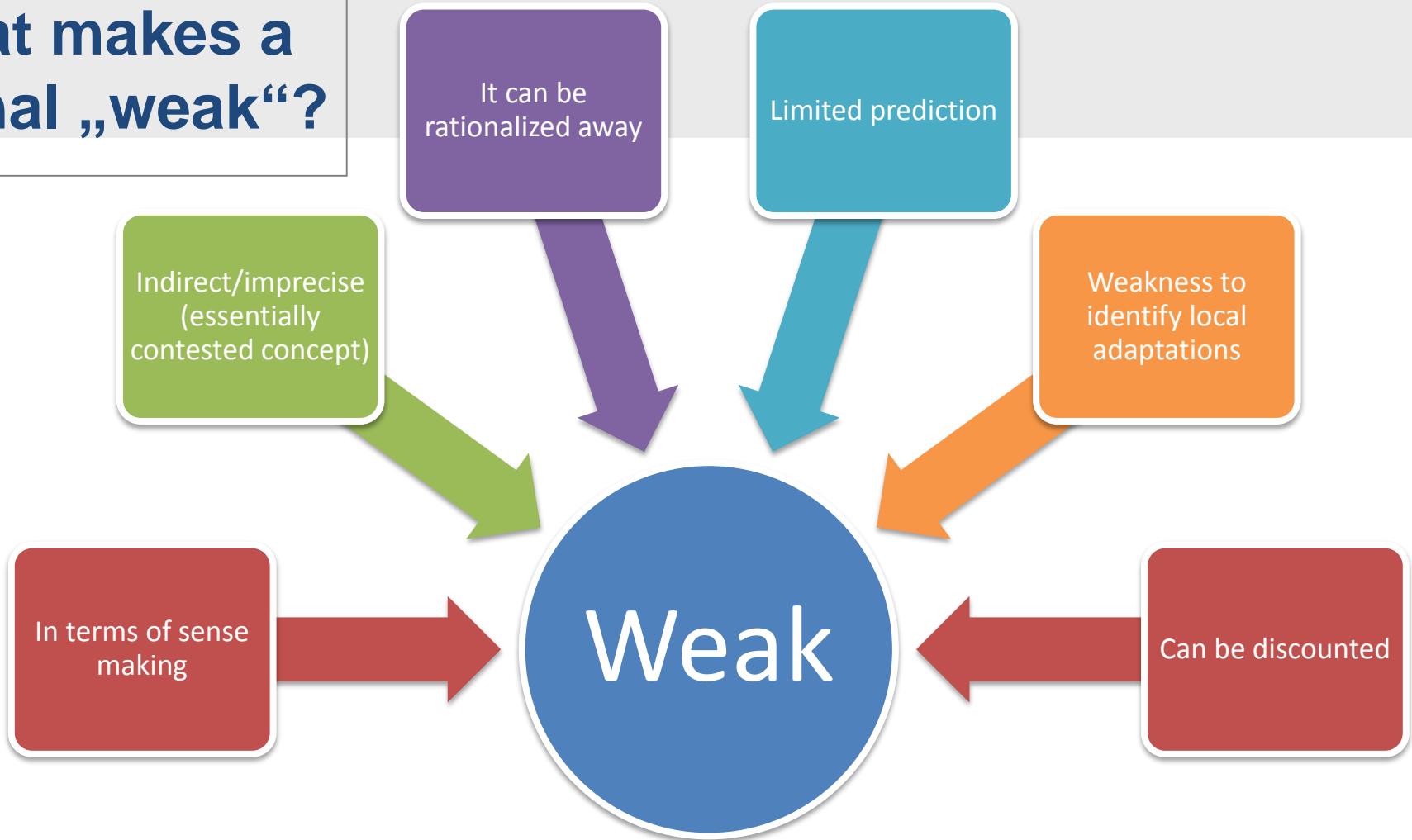


# Analysis of incident data

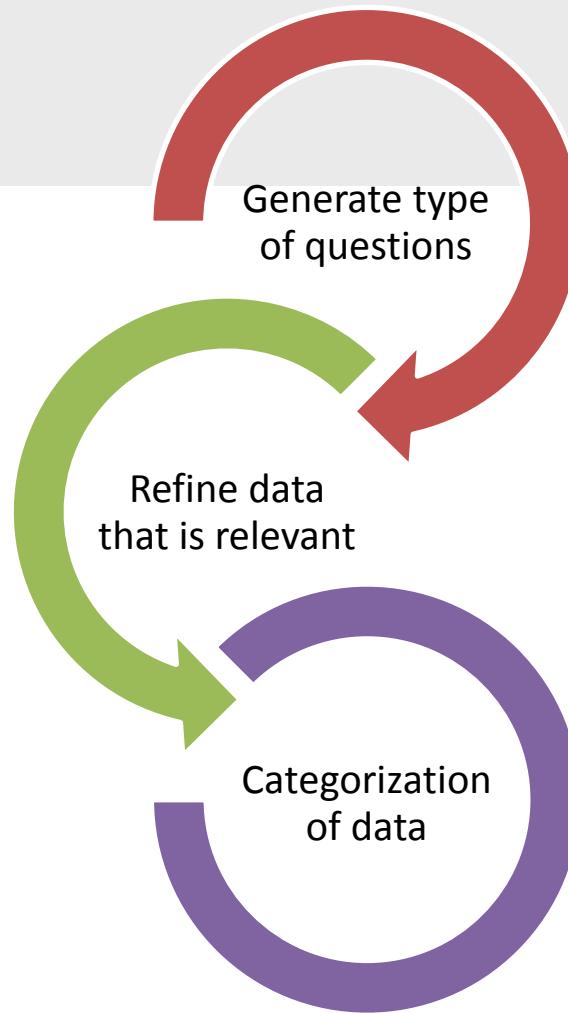
- Discussion with people who were involved and people who investigated the cases
- Rather „clear“ and „strong“ signals
- It is not the signal which is weak



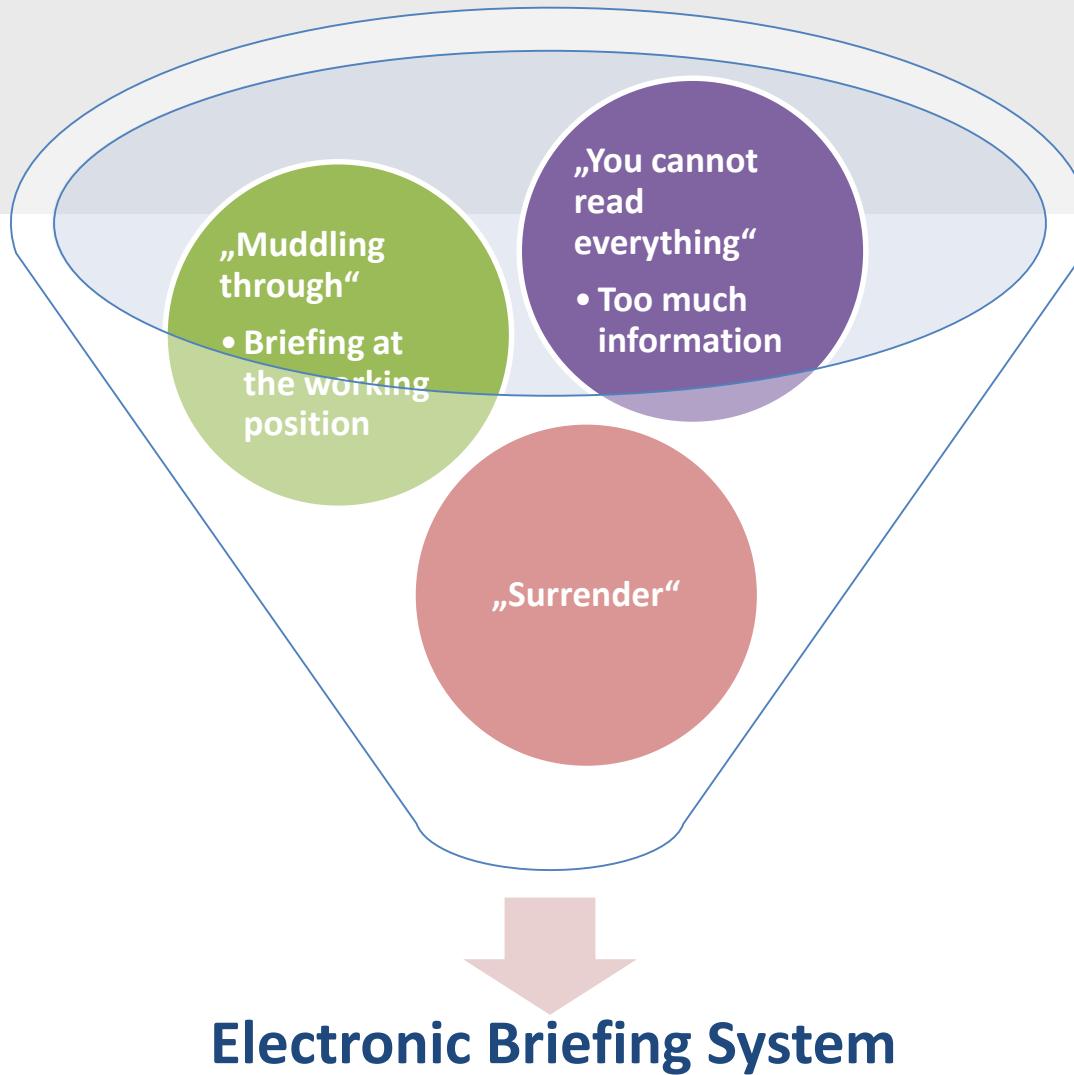
# What makes a signal „weak“?



# Analysis of the data



# Example #1



# Example 1:EBS

**Electronic Briefing System**

No News for your branch!

docs for briefing: 28

Mandatory Information

4(0 read) 24

**EBS Release 1/2014**  
Build 5.3.43-11.06.2014 (IE9)  
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Your screen resolution:  
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is not OK!!!

Toggle Fullscreen (F11)  
Clearing Cache (F12)/Cache/ (Strg+R)

Öffnen Release -Docu

AIP(AFSBw) AIP(DFS) BA-FVD ELA-E NL-Mitte System-Handbooks

INFO: EBS-ePEP-Briefchek-Änderungen, INFO: EBS-V5.3-Benutzerhandbuch

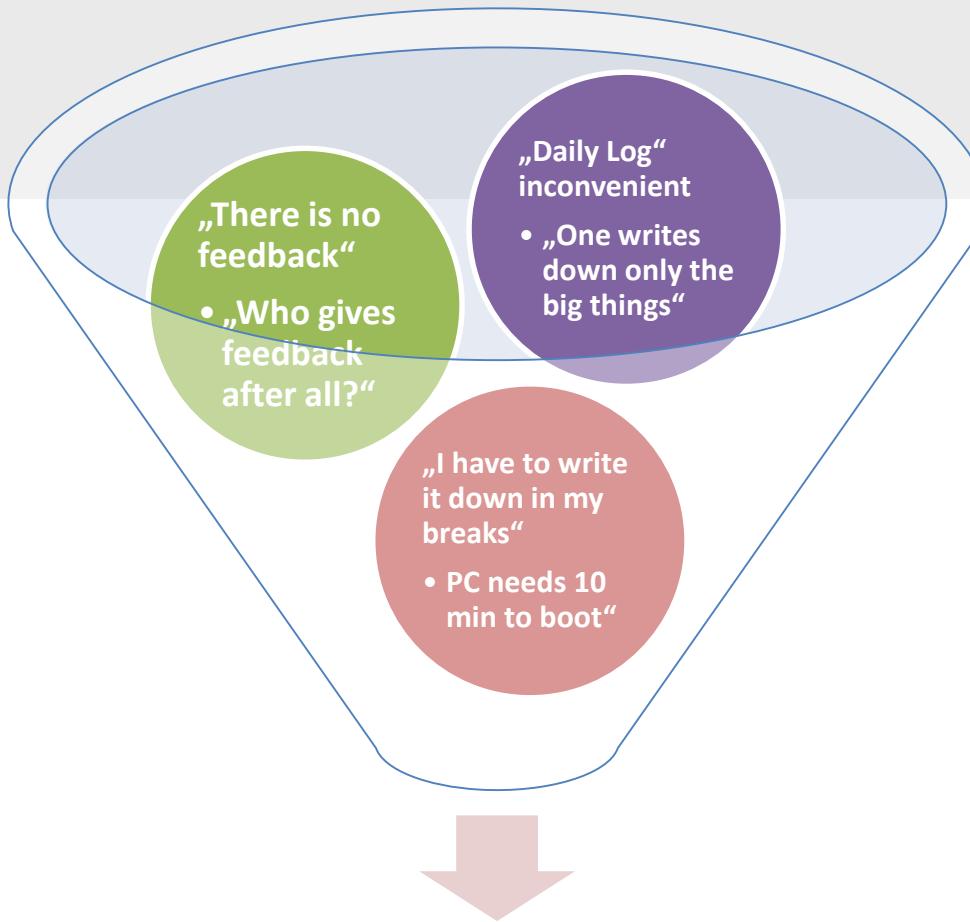
# Example 1:EBS

- Gap of making data available vs. being able to extract what is meaningful in context
- No active synchronization across different roles

Also changes in:

- Role of supervisor
- Team structure

# Example „1b“



**Transfer/reporting of information**

# Reporting systems

Home Edit Print Help Cancel

Log Nr.: 14SHL.3168

created at: 24.03.2014 11:19 CET

Daily Log System 

General | Mailing | Log tracking |

**Initiator masterdata**

User ID petch016	Username Christoph Peters/DFS	Phone (06103) 707 4063	OE VY/H	<input checked="" type="checkbox"/> Mandatory <input type="checkbox"/> nicht löschen
Kostenstelle 2071010700	Location Langen	Building Unternehmenszentrale	Office E.05.123	

**Branch:** LGN SV North

**Logtype:** Safety Management/Special occurrences  
**Sicherheitsrelevanter Eintrag**

**Logsubtype:**  Potenziell die Sicherheit des Luftverkehrs gefährdende Vorfälle  
Ausfälle/Störungen von technischen Einrichtungen

**Effective/until (hh:mm) [UTC]:** Effective time  08:19 Effective date 24.03.2014  
until time until date  UFN

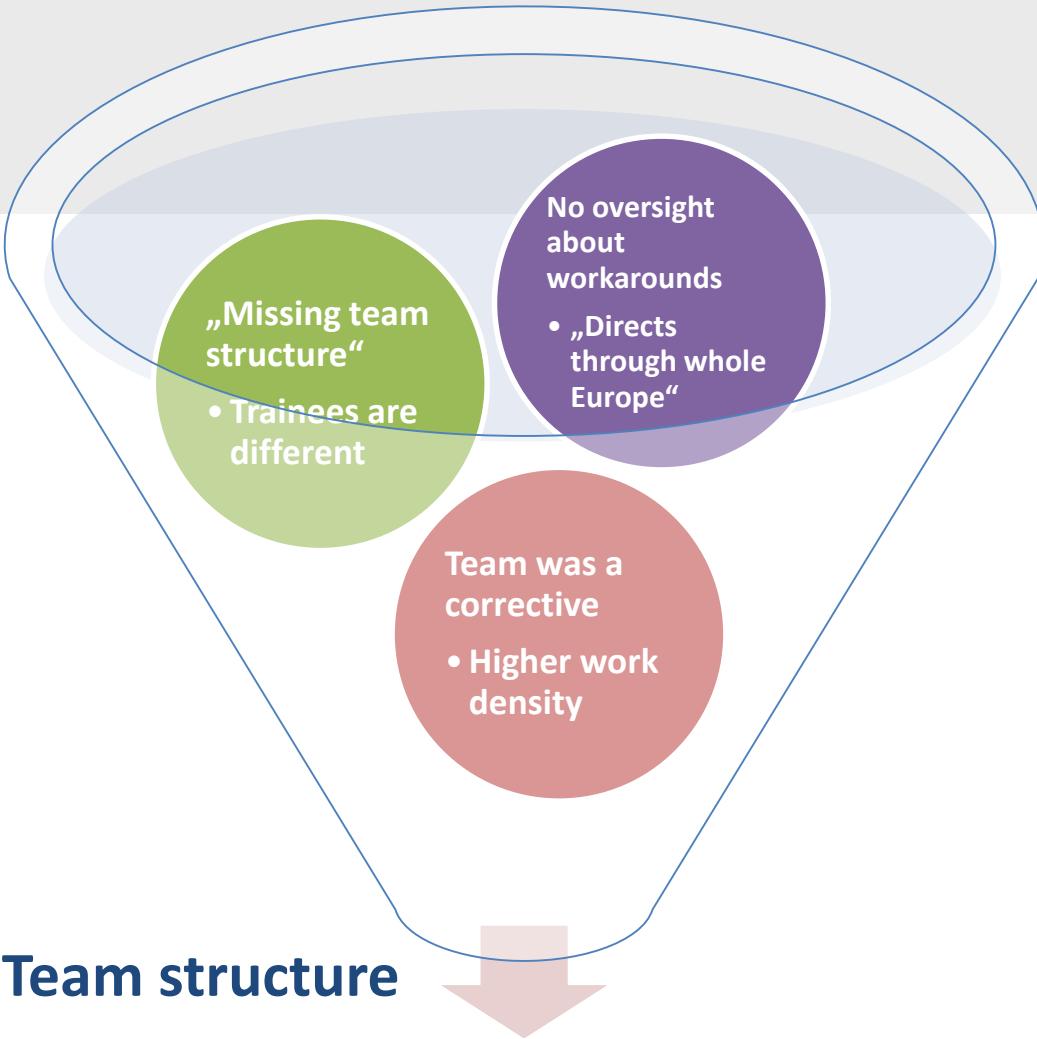
**Responsible:**

<b>Short description:</b>	✓ Ausfall ILS in <b>EDLN</b> RWY 31
<b>Description</b>	<p>Am Flughafen Mönchengladbach (<b>EDLN</b>) ist das ILS der Runway 31 ausgefallen. Es ist kurzfristig ein NOTAM veröffentlicht worden. Dieser Umstand war jedoch im Kontrollraum nicht bekannt, weder den Lotsen noch den SVen. Im EBS ist keine entsprechende Meldung veröffentlicht.</p> <p>Aufmerksam wurden wir erst durch einen Anruf des TWR-Lotsen <b>EDLN</b>, als wir eine Maschine schon weggeschickt hatten. Position der Maschine beim Anruf ca. 3 NM Endanflug. Zum "Glück" ist dieser Umstand dem Piloten aufgefallen und das Wetter hat einen Weiterflug ermöglicht. 2 Stunden vorher war in EDDL die Kontrollzone "IMC" und Wolkenuntergrenzen bei ca. 800 ft.</p> <p>In <b>EDLN</b> kommt es seit Jahren zu Einschränkungen bei den Anflugverfahren. VOR Approaches sind momentan auch nicht möglich, somit bleibt bei RWY 31 lediglich der Visual Approach.</p>
<b>Action:</b>	
<b>File:</b> <input type="checkbox"/>	26.03.2014 09:18:25 _____
	<p>Bei Ausfällen von Nav.-Anlagen und auch ILS wird ein NOTAM durch SIS veranlasst und gem. BA Technik der SV des zuständigen ACC informiert.</p> <p>26.03.2014 14:36:39 _____</p> <p>Im Fall von <b>EDLN</b> gehört das ILS dem Flughafen und wird nicht durch die DFS überwacht. Hier ist der Flughafen für die Überwachung und die Veröffentlichung von NOTAMs verantwortlich. Zudem sind die Regelungen des LoA zu beachten (Austausch von relevanten Informationen zwischen den Kontrollstellen).</p> <p>08.04.2014 12:33:10 _____</p>

# Reporting systems

- Workload is saturated („I won´t do the extra task“)
- People often don´t see a benefit
- „If I don´t see the system as a whole not doing anything with the report I don´t report“
- **Are you passive waiting for information or an active exploring organisation?**

## Example 2



So 14.09.	Mo 15.09. (today)	Di 16.09.	Mi 17.09.	Do 18.09.	Fr 19.09.	Sa 20.09.	
STD	BASE	1 1 1 2 2 3 3 3 3	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5
AVAIL		0 0 0 0 0 2 3 3 3 3	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5
SBY		0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
DLDN	BASE	0 0 0 0 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2
AVAIL		0 0 0 0 0 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2
SBY		0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
WP-Config		0 0 0 1 4A SA SA SA	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7
		5 6 06:59 8 9 10 11 12 13 14 15 16 17 18 19 20	5 6 06:59 8 9 10 11 12 13 14 15 16 17 18 19 20	5 6 06:59 8 9 10 11 12 13 14 15 16 17 18 19 20	5 6 06:59 8 9 10 11 12 13 14 15 16 17 18 19 20	5 6 06:59 8 9 10 11 12 13 14 15 16 17 18 19 20	5 6 06:59 8 9 10 11 12 13 14 15 16 17 18 19 20
0530-1300	YEM	EBS IBNA					
0530-1300	YYW						
0545-1315	YMQ				ok ca	# 01	
0545-1400	YLS	EBS				rq am 1130 #2	
0545-1315	YCR	EBS				verschoben ok DG	
0600-1330	YNM						
0645-1415	YDJ	EBS					verschoben, BF
0645-1415	YTL		EBS				Morgen 30 Min Ü am Anfang möglich?
0700-1430	YXX		EBS	IBNA			
0715-1530	YCT		EBS	IBNA			
0745-1700	Y	YCT: Christoph Peters			EBS		
1315-2045	YI	ABQ					
1315-2130	YI	Roles responsible: DLAB, DLAQ, DLAT, DLDQB, DLDQS					
1345-2200	YJK				EBS		
1345-2200	YRF						
1430-2245	YLT YPR						
1430-2245	YPR YLT						
1445-2300	YPT YEH						
1445-2300	YEH YPT						
1500-2230	YPS			morgen 30 min. UV am Ende OK?			
1500-2230	YTA YNB				EBS	IBNA	
1500-2230	YNB YTA				EBS		
1545-0000	YAX YFZ				EBS		
1545-0000	YPZ YAS			kommt 17h hg			
2145-0600	YBS					stby	
2145-0600	YPI						EBS

## Example 2: Team structure

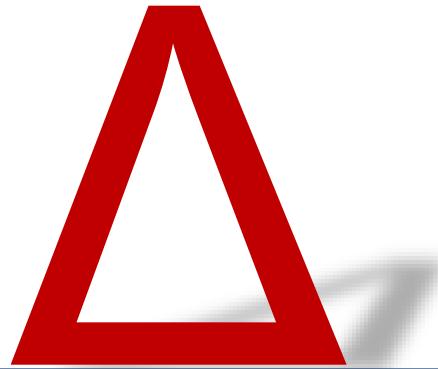
- From team work structure to a role structure
- „Total flexibility“
- Team as a „correctiv“ no longer exists
- Training changes



# Adaptations cloak the „real“ picture

- Adaptations hide workload bottlenecks
- Local adaptions: do we want this on a global scale?

„Work as imagined“

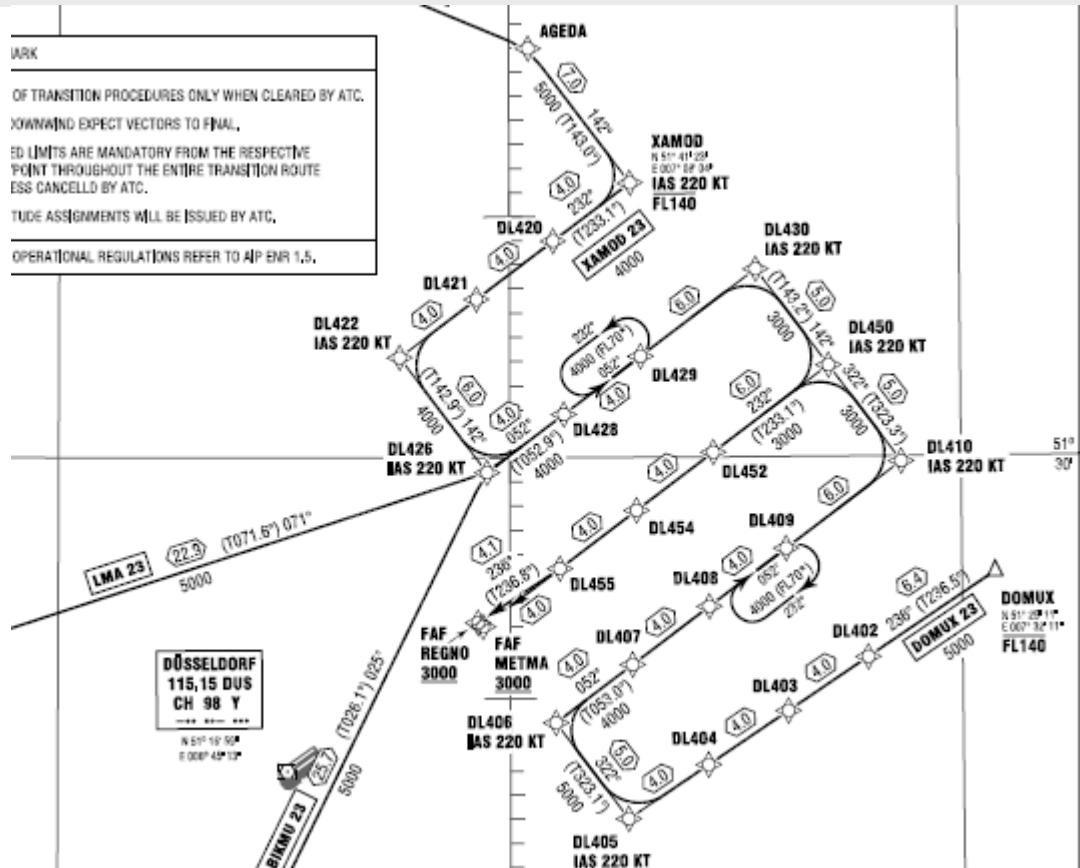


„Work as actually done“

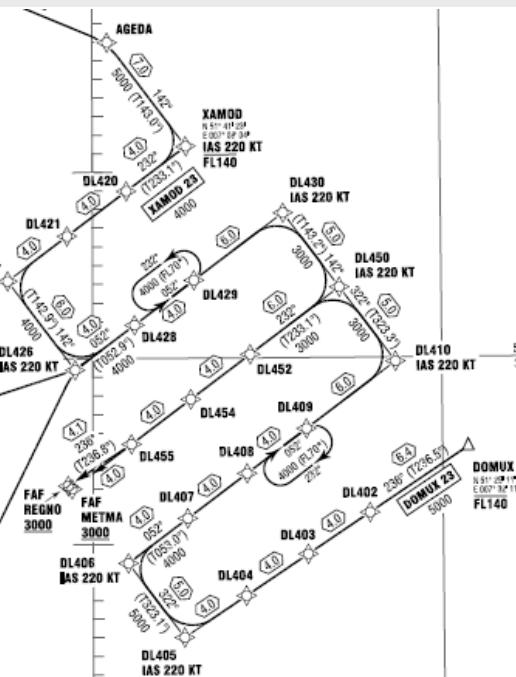
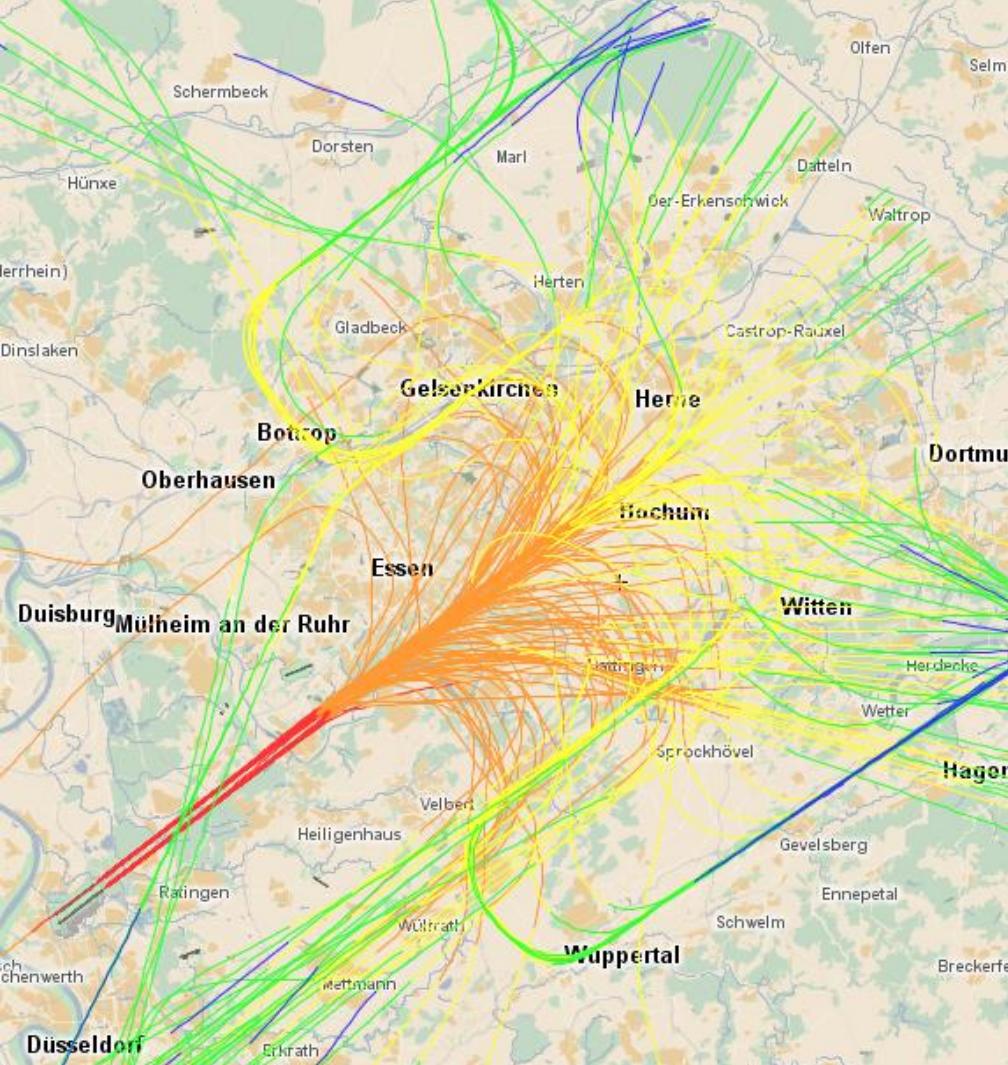


© F. Riegler

# Approach EDDL (as imagined)



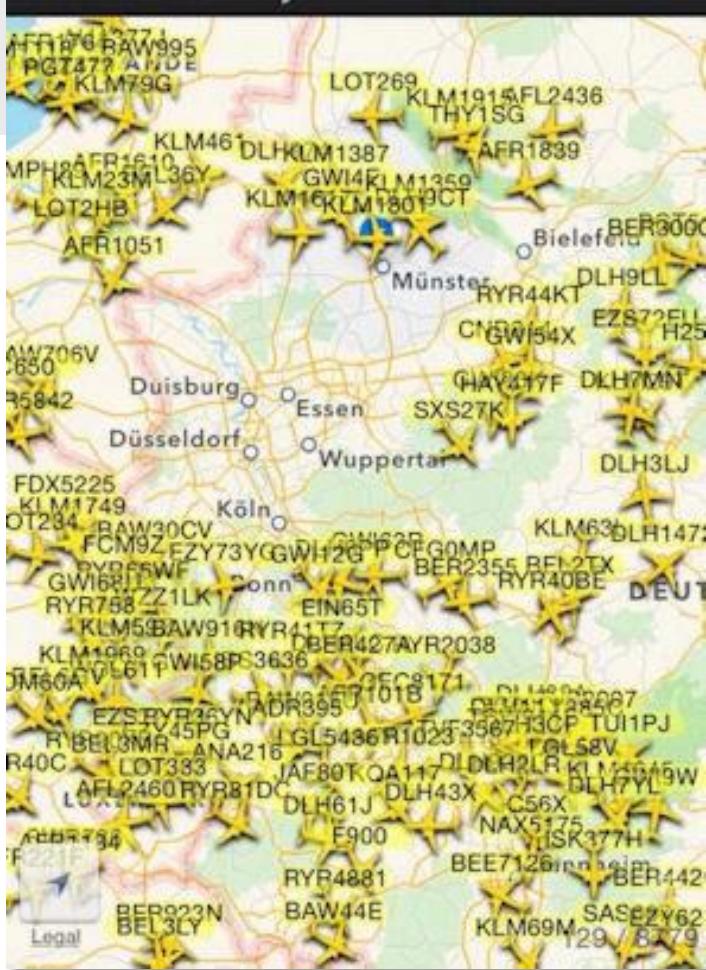
# And as done...



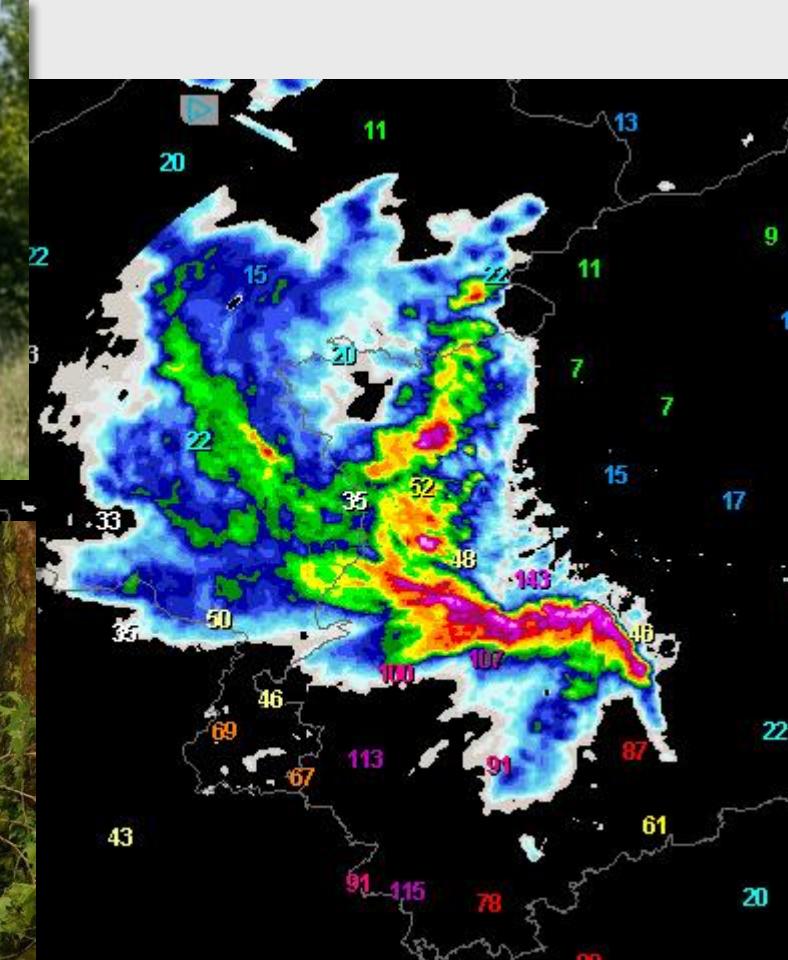
# Workaround

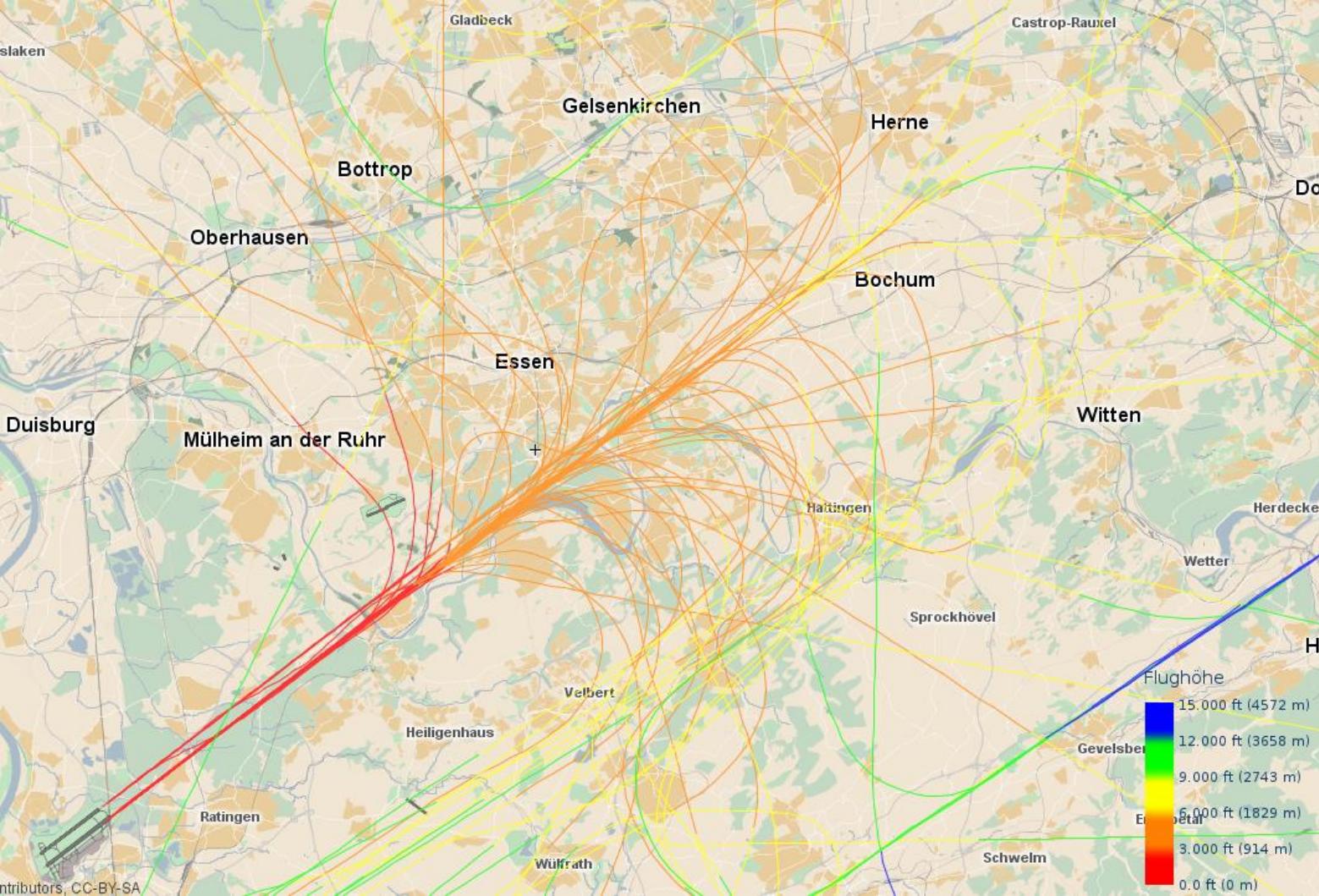


# Bad weather (09.06.2014)



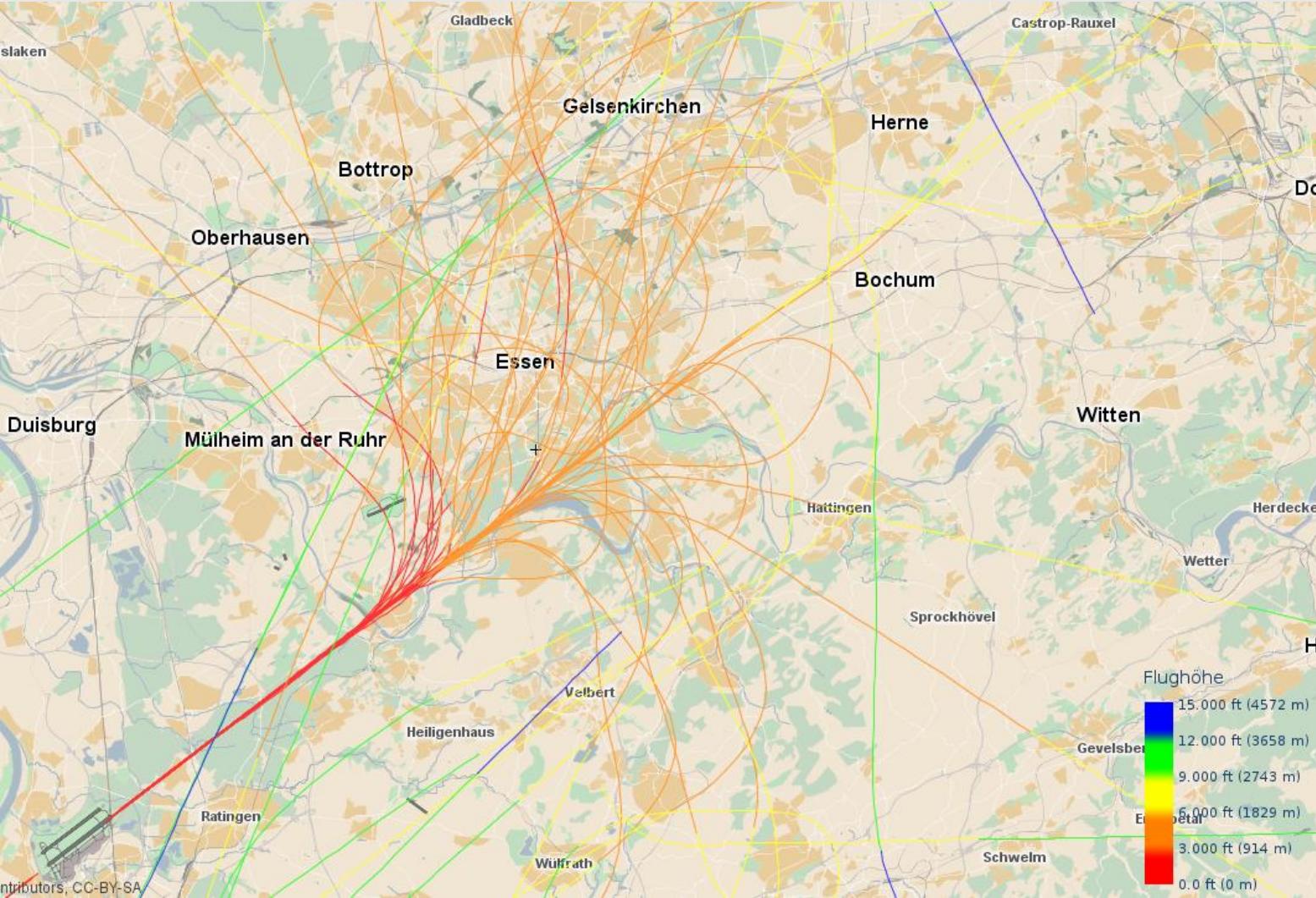






# Flight tracks (09.06.2014)

# 20.06.2013 Inbounds (1200-1500)



# Coordination



# Weak Signals - Conclusions

- Extension from a reactive into a proactive SMS
  - Transfer into a learning organization
  - Make adaptations visible
- 
- Perspective shift is required
  - Being sensitive / primed to weak signals

# Weak Signals

*“As soon as you go proactive all the notions of ‘weak’ become very strong and important”*

(David D. Woods, 2012)