New developments in ATFM/CDM

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Much more than an ATFM system

- **OPTICON** : optimum sector configuration application

- **PATHFINDER** : easy to find alternative route using the Map

- **NIA**: Network Impact assessment - analyses the potential impact of any ATFM measure.

- **FE GRRT**: group rerouting tool offering latest available more efficient routes

- **E-Helpdesk**: pc to pc help desk allowing much better and faster management of the queries from customers.

- **SIMEX**: Stand alone simulation tool.

- **ATFCM situation display**: shows at any moment ATFM situation in Europe.

- **GLANCE**: enables users to see different profiles of a flight

- **METEO updates**: 4 times in 24 hrs

- **NOP portal**: interactive information tool

- **Flight List**: all partners can retrieve and display detailed information on any flight
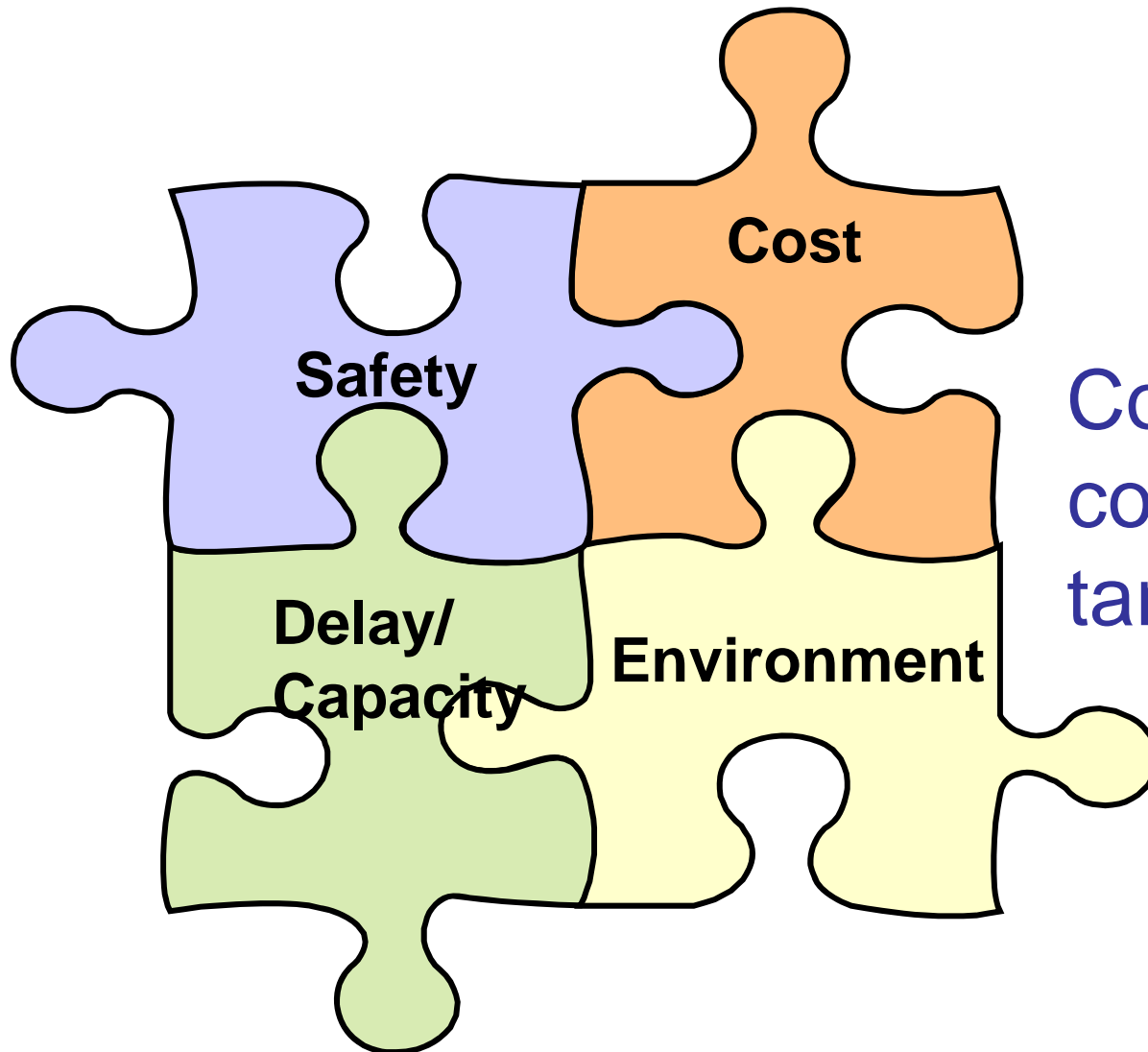
New developments in ATFM/CDM

- **Performance driven**
  - **Performance targets**
  - **The playbook**

- **Flight Efficiency**

- **Weather – Anticipation, recovery, resilience**

- **Short term ATFM measures - STAM**

- **Collaborative Traffic Management (CTM)**

The Performance Puzzle

Safety

Cost

Delay/ Capacity

Environment

Competing or complementary targets?

European Targets 2015 to 2019

Environment KPIs

   Continue improvement of FPL to reach 4.1% in 2019

   Actual Trajectory to reach 2.6% in 2019

Enroute Delay KPIs

   Maintain at 0.5 minutes/flight

Safety KPIs

   Level D maturity for Safety policy, risk management, assurance, level C for safety culture

   Risk Analysis tool applied to safety occurrences

Cost KPIs

   Further reduction in ANSP charges

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The Playbook – The Plan – Meeting delay targets

DELAY	PLAYBOOK	TUESDAY	18/08/2015				
NETWORK DELAY	2010	2011	2012	2013	2014	EN Target	
LAST 5 YEARS	62280	61346	21206	9789	29003	2.475	
	W-4	W-3	W-2	W-1			
LAST 4 WEEKS	50504	47695	51599	41845			

ACC DELAYS CAPACITY & STAFFING

ACC	RISK INDEX	W-4	W-3	W-2	W-1	Target	
LGGG/MD	3770	3153	2082	9673	5832	5041	Staffing + capacity risk/ w-1: Rodos-lower and KFPL combi sector
LFRRACC	2427	7935	2069	2866	4917	2210	Staffing + capacity risk/ limited sectors available before 0800
LECBACC	1713	1101	935	3426	2739	921	ATC capacity risk/ morning: Ponent1-upper, afternoon: Balse sector
LDZOACC	1685	3486	2557	3177	636	1303	Risk of staffing + capacity /Adriatic sectors and elements thereof
LCCCACC	1341	4475	3670	1047	110	1106	Staffing + capacity risk
LTAAACC	657	666	1951	1101	1221	95	ATC capacity risk/ all day - traffic via: ODERO
LFEEACC	574	1897	842	730	181	276	ATC capacity risk/ East + Central CTA complex from 0800
EGTTTC	486	770	0	554	2548	0	Staffing risk/ Thames sector
LFBBALL	468	1231	445	725	1103	202	ATC capacity risk/ morning: X4, L4 sectors and GO12T sub-flow
EDYYUAC	349	738	1055	292	707	0	ATC capacity risk/ Brussels sectors
POP UP							CAUSE:

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The Playbook – Post Ops - Actual

DELAY	PLAYBOOK	TUESDAY	18/08/2015				
NETWORK DELAY	2010	2011	2012	2013	2014	**EN target**	**EN+AD actual**
LAST 5 YEARS	62280	61346	21206	9789	29003	**9.789**	**56.485**
	W-4	W-3	W-2	W-1		**EN actual**	
LAST 4 WEEKS	50504	47695	51599	41845			

ACC DELAYS CAPACITY & STAFFING

ACC	RISK INDEX	W-4	W-3	W-2	W-1	Target	ACTUAL	
LGGG/MD	3770	3153	2082	9673	5832	5041	7.571	9 s all day / KFPL = 2,886, West = 2,707, Rodos-lower = 1,750 / 8 FL
LFRRACC	2427	7935	2069	2866	4917	2210	6.798	11 s until 0800, then 15 s / am delay > 093 2,113 mins / 2 FL
LCCCACC	1341	4475	3670	1047	110	1106	4.581	4 s 1h30m / East = 1,927, South 2,435 / 2 RR
LECBACC	1713	1101	935	3426	2739	921	2.200	Med-Integrated evening due staffing = 1.297
LTAAACC	657	666	1951	1101	1221	95	2.193	midday = 1,478 / ave = 21 min, peak hour ave = 36 / 4 flights > 45 mins, AFR218 68 mins
LFEEACC	574	1897	842	730	181	276	1.218	
EGTTTC	486	770	0	554	2548	0	1.184	ATC staffing / morning regulation for the Lorel sector
LDZOACC	1685	3486	2557	3177	636	1303	571	
EDYYUAC	349	738	1055	292	707	0	116	4 FL
LFBBALL	468	1231	445	725	1103	202	54	4 FL
						TOTAL	**TOTAL**	
						15670	**28448**	

POP UP — **CAUSE:**

| ACC	RISK INDEX	W-4	W-3	W-2	W-1	Target	ACTUAL	CAUSE
LPPCACC	197	531	824	0	0	0	1.145	1 FL
EPWWACC	264	100	426	160	67	1407	750	
EDUUUAC	705	0	1461	44	0	252	67	
LECMACC	600	911	163	0	0	106	0	3 FL
LZBBACC	0	0	0	0	0	0	0	2 FL
EDWWACC	94	0	111	0	215	31	0	1 RR

Support to Airline Flight Efficiency – Post OPS

Airline past Trajectories viewer

This tool facilitate visualization and comparison of flight plan trajectories for any past period of time, offering to companies a way to realize how "efficient" they were, and, if not, to suggest possibly better flight planning that can be effectively proposed, the day of operation, by other tools like Eurocontrol "Route Opportunity".

LSGG	EGLL	A319	BAW735	360	Sun	20130721	164500	361.8	00:48
LSGG	EGLL	A319	SWR31J	360	Sun	20130721	183500	355.5	00:48
LSGG	EGLL	A320	BAW7GG	360	Sun	20130721	200000	361.8	00:48
LSGG	EGLL	A321	BAW741	360	Sun	20130728	074500	361.8	00:47
LSGG	EGLL	A319	BAW725	380	Sun	20130728	081016	361.8	00:47
LSGG	EGLL	A319	SWR37M	380	Sun	20130728	103500	440.3	00:57
LSGG	EGLL	A319	BAW27G	380	Sun	20130728	103822	354.5	00:46
LSGG	EGLL	A319	BAW729	380	Sun	20130728	114025	354.5	00:46
LSGG	EGLL	RJ1H	SWR35V	300	Sun	20130728	132500	355.6	00:53
LSGG	EGLL	A319	BAW731	340	Sun	20130728	135500	354.5	00:47

Airlines have their ICAO company code(s) set automatically, so that the callsigns of other companies whose flight plan data is displayed will not appear.
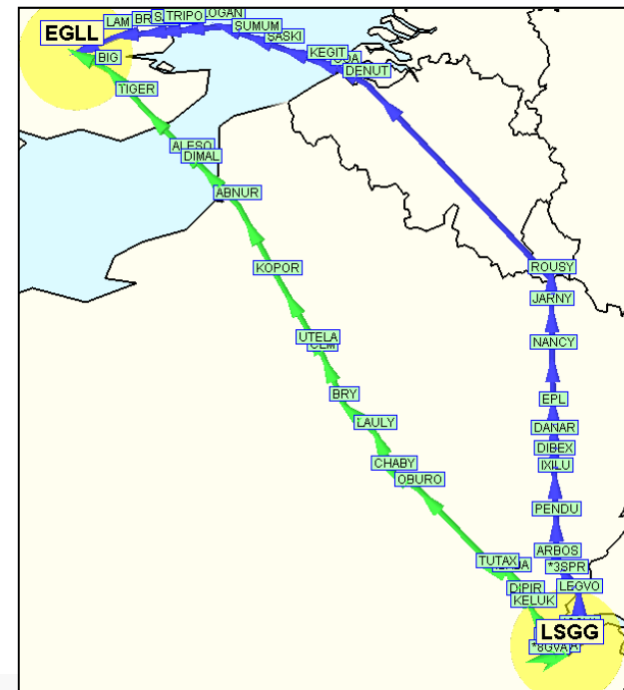
The Route Opportunity Tool - TACTICAL

- Make airspace users aware of the latest route network availabilities for their flight….considering their cost constraints.

- ETFMS feature that allows a re-computation of the profile considering

  - Wind

  - Last ATFCM situation

  - Generic costs per AO or in general such as fuel cost, cost of minute flying, cost of DLA…..

- We generate this computation as many time as required per day. Results, if existing, are presented in the flight list (CHMI or NOP)

- Last choice of using it remains to the FPL originator.

Flight Planning Improvements - Strategic

- **Identification of improvements in flight planning for various flows and city pairs taking into account the latest network situation**
  - An interactive tool is currently developed to allow all AOs and CFSPs to compare their flight plans with the best filed flight plan accepted by IFPS during the last AIRAC cycle
  - The airspace users and the CFSPs will have the possibility to detect new implemented routes, CDRs available during similar periods of time, etc.
  - It is expected that the airspace users and the CFSPs will use this interface to improve their flight planning for the "next" AIRAC cycle;
  - This tool could also be used to assess individual airline flight plans or to detect possible network performance evolutions;

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Flight Planning Improvements in the Pre-Tactical /Tactical Phases:

- **Evaluation of scenario "cost"**
  - Comparison between DLA saved vs. cost for AO;
  - Implement this for scenario CDM

- **Tactical RAD relaxations**
  - Based on existing Crisis Procedures;
  - Similar procedures could be implemented during normal operations as comparisons between actual trajectories and flight plans show that the RAD is not systematically followed during tactical operations;
  - Tactical relaxation of RAD could be also envisaged during the night or during period of low demand.

- **Network impact assessment**
  - Enhanced assessment of AUP at D-1 and in tactical with proposals made to AOs on the basis of available airspace;
  - Enhanced ASM impact assessments, including for military exercises.

Preventive by improved resilience rather than reactive measures

WEATHER	PLAYBOOK MONDAY 26/05/2014						
NETWORK DELAY	2009	2010	2011	2012	2013	**TARGET**	A
LAST 5 YEARS	23535	60070	54603	35727	10614	14525	
	W_4	W_3	W_2	W_1			
LAST 4 WEEKS	14106	7439	22695	13750			

ACCs				
ACC	**DESCRIPTION OF WEATHER RISK**			**ACTUAL**
LECB	CB's		20	1809
EDUU	CB's		677	826
LDZO	CB's		76	82
EDYY	CB's		180	2517
EDWW	Wind		221	678
EDGG	CB's		656	2348
EDMM	CB's		416	2831
LSAG	CB's		254	1159

AIRPORTS				
AIRPORT	WEATHER RISK		**TARGET**	**ACTUAL**
EBBR	WINDS rwy in use		1921	1463
EHAM	TSRA		2238	908
EDDF	TSRA		939	6090
EDDM	TSRA		680	3519
EDDS			0	623
EPWA			400	459
LFLL			775	150
LFP			617	566
	RA		786	985
	TSRA		802	170
	Wind		1246	933
	TSRA		121	17
			TOTAL	**TOTAL**
			14525	28133

POP UP
WP3: REF.0600:

EHAM	surface winds	YELLOW
EDDF	surface winds	YELLOW

Basic risk model based on previous experience

It is not about helping the local ATFM to implement more ATFM measures

It is about increasing our Network resilience so that fewer and more refined measures will be needed

Natural Hazards and not just Weather

Weather
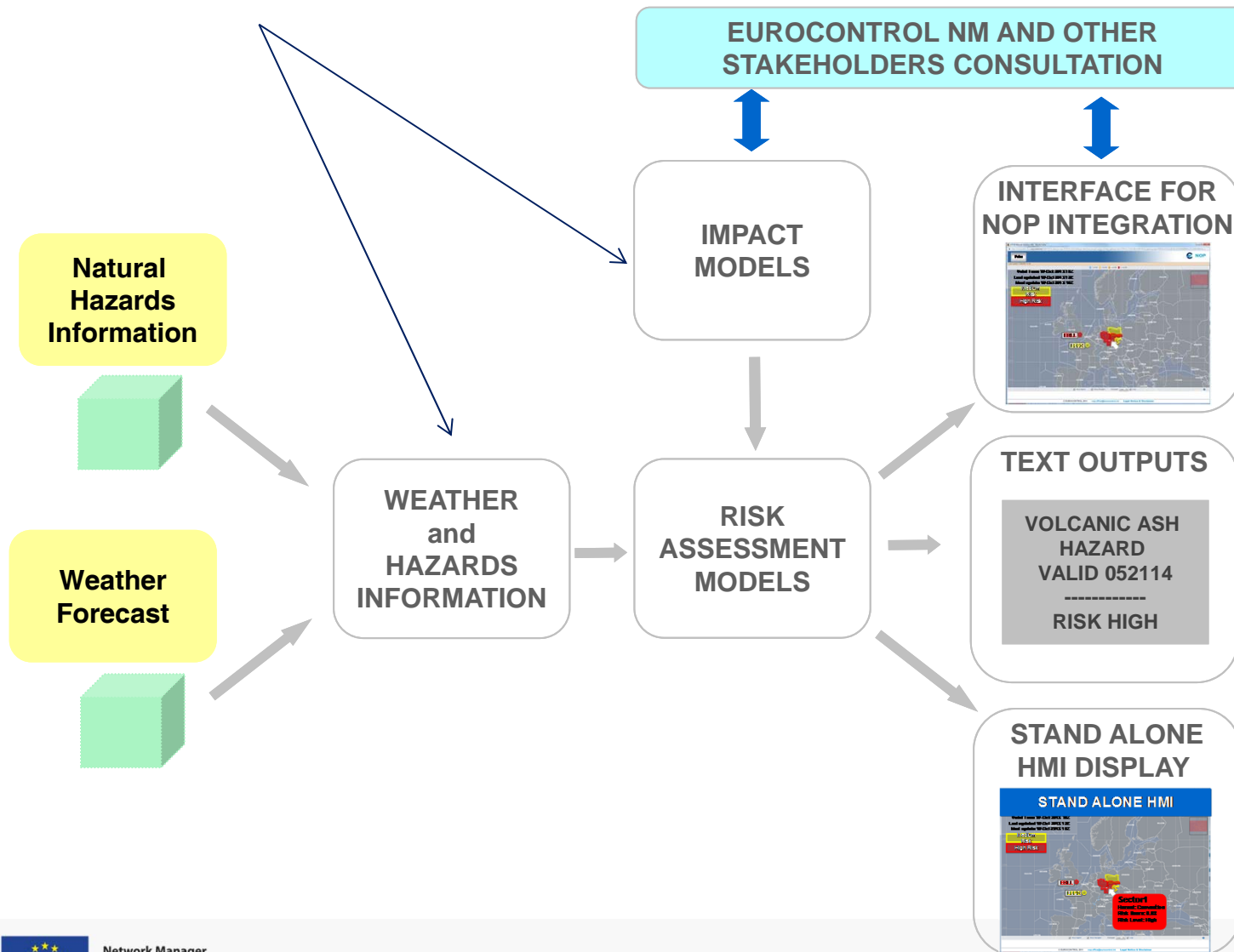
- **Airport**
    1. **Ceiling and visibility**
    2. **Surface winds**
    3. **3000ft wind**
    4. **Winter weather**
    5. **Terminal convection**

- **En-route**
    6. **Convective weather en-route**

Natural Hazards

- **Observation-based data:**
    1. **Volcanic Ash**
    2. **Nuclear Emissions**
    3. **Hazardous Chemical Dispersion**
    4. **Fire**
    5. **Earthquake**
    6. **Flooding**
    7. **Space Weather**

- **No risk score is calculated, map will indicate the location of the hazard, as defined by the authoritative source**

NM developed a tool with 2 inputs

EUROCONTROL NM AND OTHER STAKEHOLDERS CONSULTATION

Natural Hazards Information

Weather Forecast

WEATHER and HAZARDS INFORMATION

IMPACT MODELS

RISK ASSESSMENT MODELS

INTERFACE FOR NOP INTEGRATION

TEXT OUTPUTS

VOLCANIC ASH
HAZARD
VALID 052114

RISK HIGH

STAND ALONE HMI DISPLAY

STAND ALONE HMI

The output are alerts

- It is not another weather service
- Pre-tactical alerts for potential capacity risks
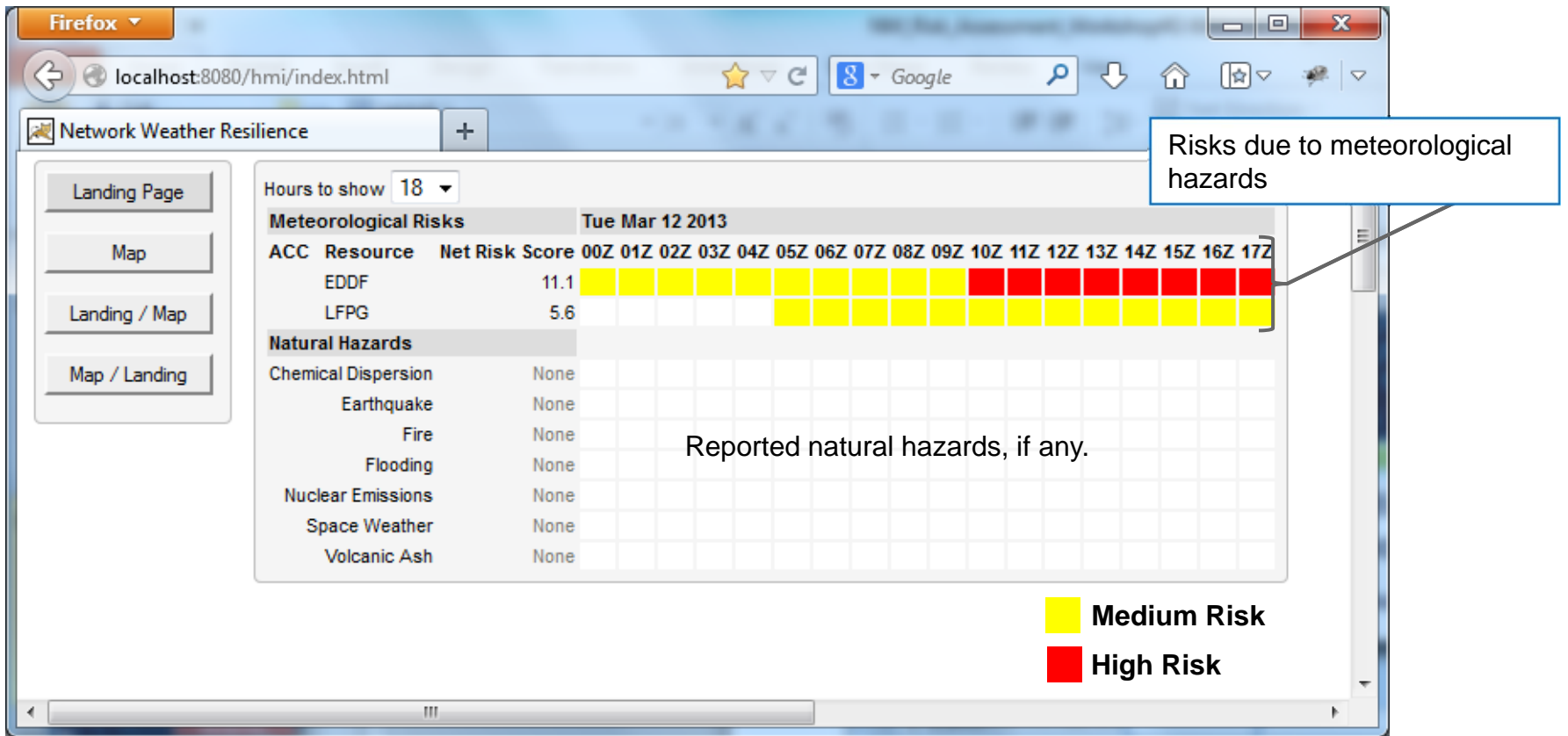
View of weather resilience map – surface wind and terminal convection risk for LTBA
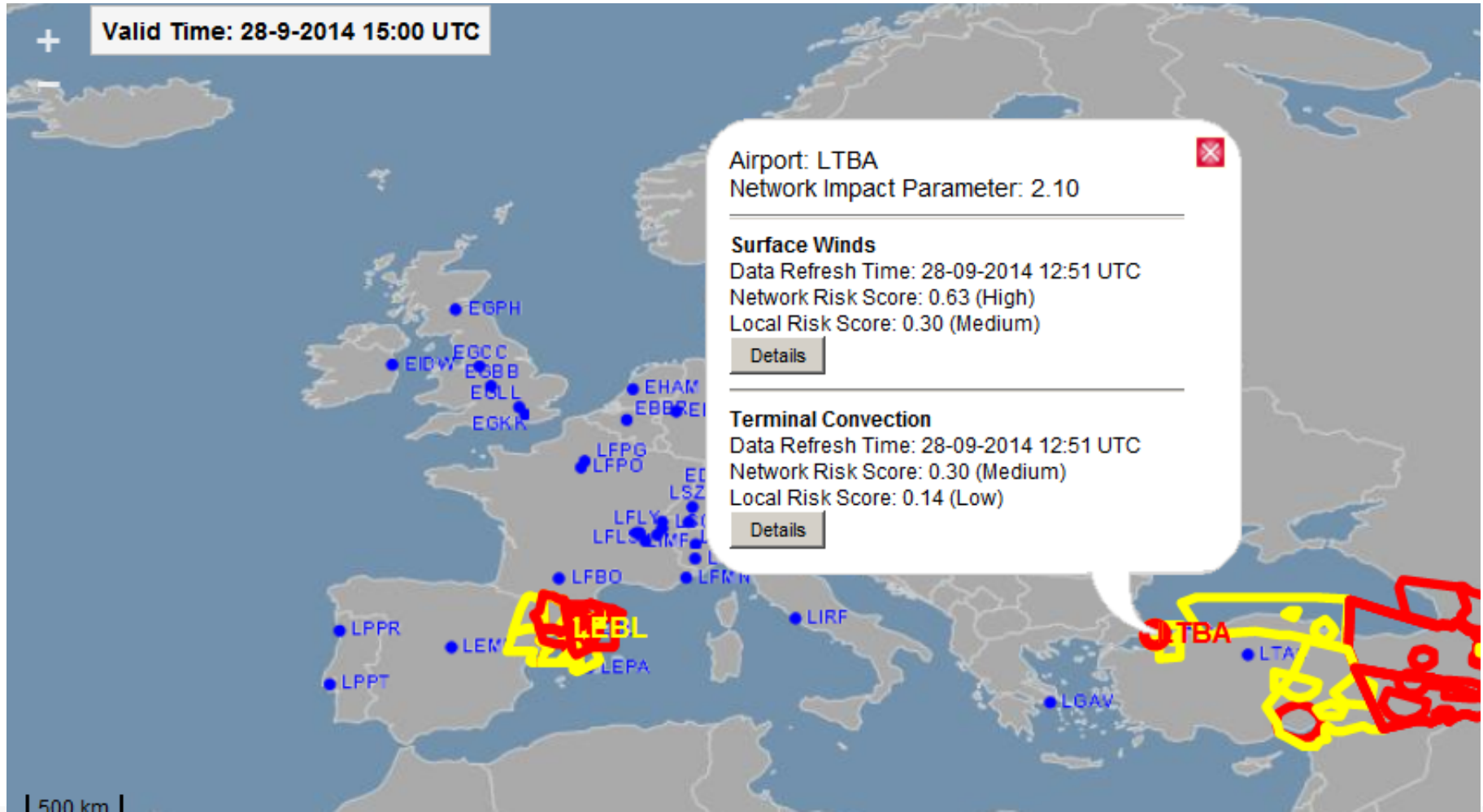
Short Term ATFM Measures – STAM - Principles

- STAM is ONE of the available measures to balance Demand with Capacity.

- Objective: limit the impact of ATFM issues on the Demand

- Scope: on the day of operation

- Based on cooperative approach, CDM and information sharing involving

  - Local ATFM position (FMP)

  - Network manager (NM)

  - Airspace Users (AUs)

- Fill the gap between current ATFM and ATC
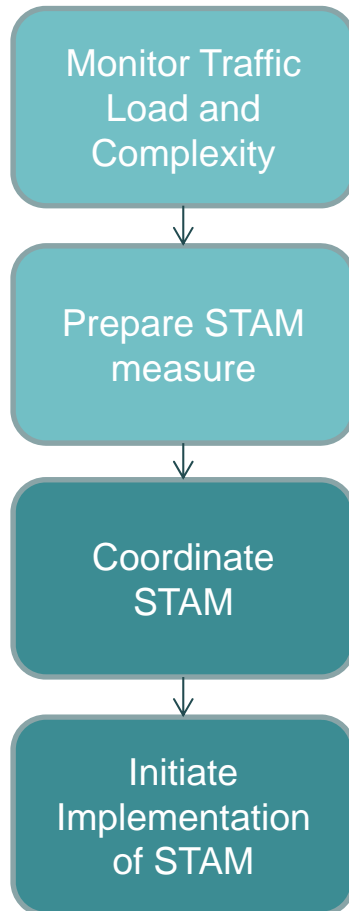
- Provide dynamic and optimized solutions

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CONOPS
STAM Process: Monitor and Prepare

Monitor Traffic Load and Complexity

↓

Prepare STAM measure

↓

Coordinate STAM

↓

Initiate Implementation of STAM
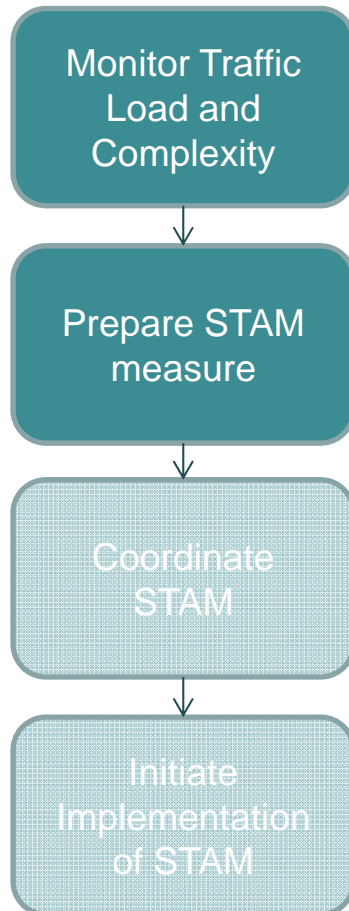
- FMP monitors traffic load and complexity
    - Occupancy counts (global network reference for STAM)
    - Complexity/Workload assessment (local tool, expert judgement…)

- FMP declares a hotspot for a given traffic volume during a time period

- FMP defines a set of STAM measures to reduce traffic overload in the declared hotspot
    - Selects flights to be impacted
    - Selects adapted measure with the flight status
    - Tests the measure's efficiency using What-if simulations
    - Defines the role of the stakeholders in the coordination process

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CONOPS
STAM Process: Coordinate and Implement

```
Monitor Traffic
Load and
Complexity
        ↓
Prepare STAM
measure
        ↓
Coordinate
STAM
        ↓
Initiate
Implementation
of STAM
```

- FMP initiate the coordination process with impacted stakeholders
  - Appropriate FMPs, AOCs, NMOC, SUP, TWR
  - NMOC performs by default a Network Impact Assessment?
  - AUs, if capacitated, may reject/propose update to a STAM

- FMP coordinates the implementation of the STAM measures only
  - With approval by all stakeholders
  - not after implementation deadline
  - and if traffic overloads persists

- FMP monitors the implementation

Identified issues

- Definition and Time frame of STAM

- Hotspots concept

- Scenarios management – predefined solutions

- Roles & Responsibilities: FMP, NM, AO

- Network Impact Assessment

- Definition/use monitoring values, workload

- Relationship between STAM, AMAN, XMAN and added value of CTM

CONOPS
STAM Definition
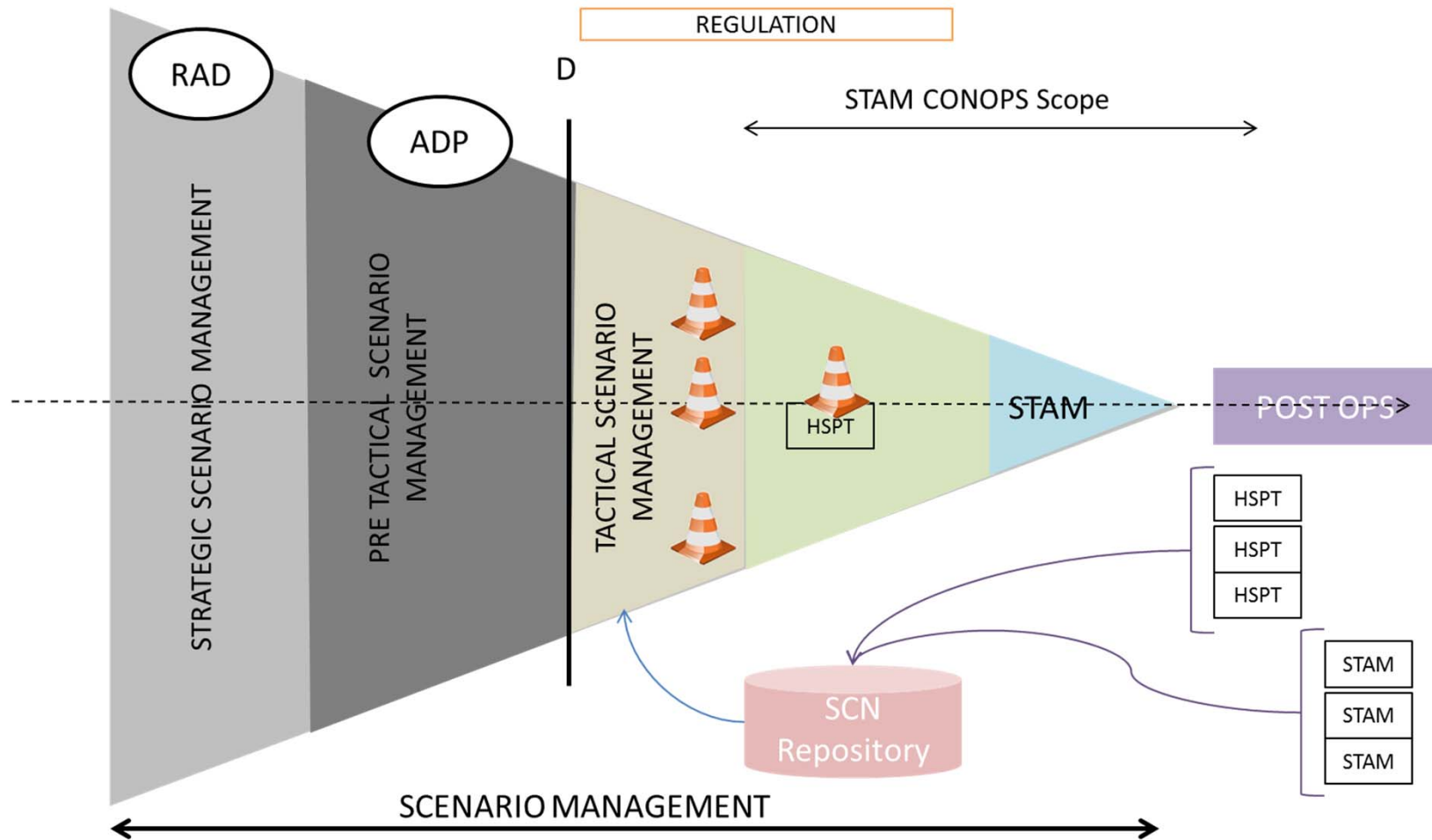
Some STAM measures

- **Mandatory Cherry Picking (not global regulations)**

- **Target Times**

# Implementing STAM – ground or airborne

On the ground, the AOC or FC can optimise their trajectory to achieve the Target Time and then update their FPL (EETs / speed changes)

Once airborne, the flight crew incorporate the target time information into their flight management to best achieve the planned Target Time; contributing to the planned resolution of the hotspot
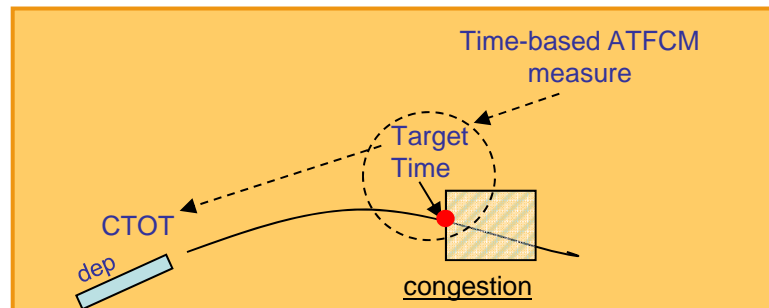
Current (ATFCM) time based operations

Now:
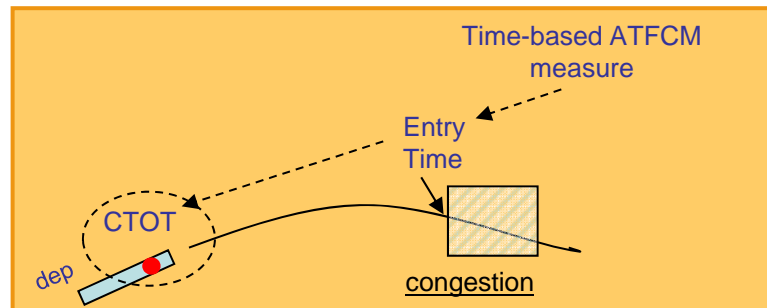
Issues:
- Assumed profile not always the actual profile
- Objective of CTOT not managed after take-off
- Actual trajectory and sector entry time can significantly deviate from intended ATFCM measure

Proposed (ATFCM) time-based operations

New:

Development areas:

- Cooperation within executive phase
- Measuring / monitoring effectiveness
- Flight planning and implementation predictability
- Link to other time-based functionalities (e.g. AMAN)

Cooperative Traffic Management
medium/long term objectives

New Traffic predictability processes,
addressing flight planning improvements including predictability
requirements in the executive phase*