

Time-line concept for Collaborative Workflow Management in :

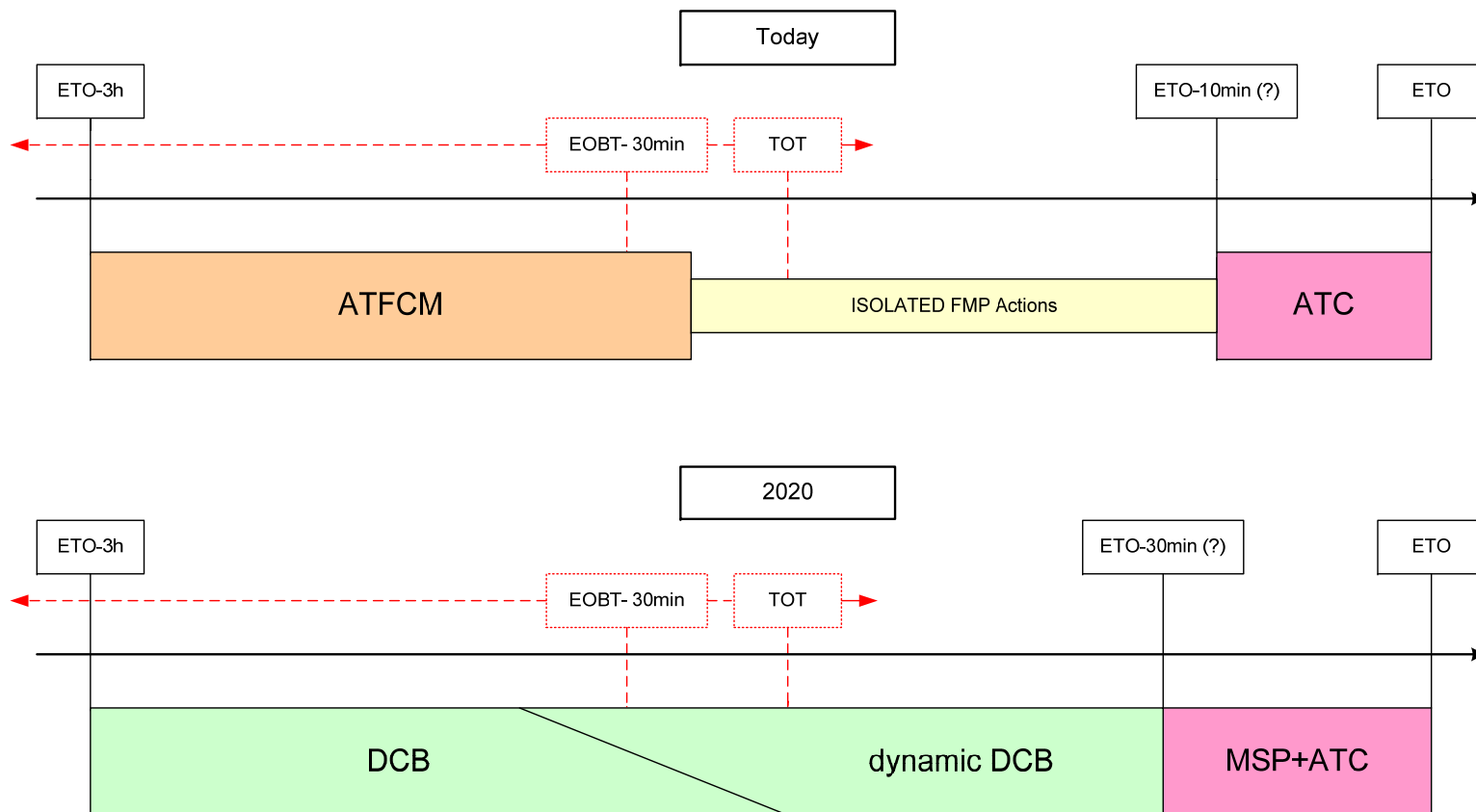
dynamic
Demand
Capacity
Balancing

SESAR
WP 07 06 05

Marcel RICHARD
Expert ATFCM
Operational Specifications
& Requirements



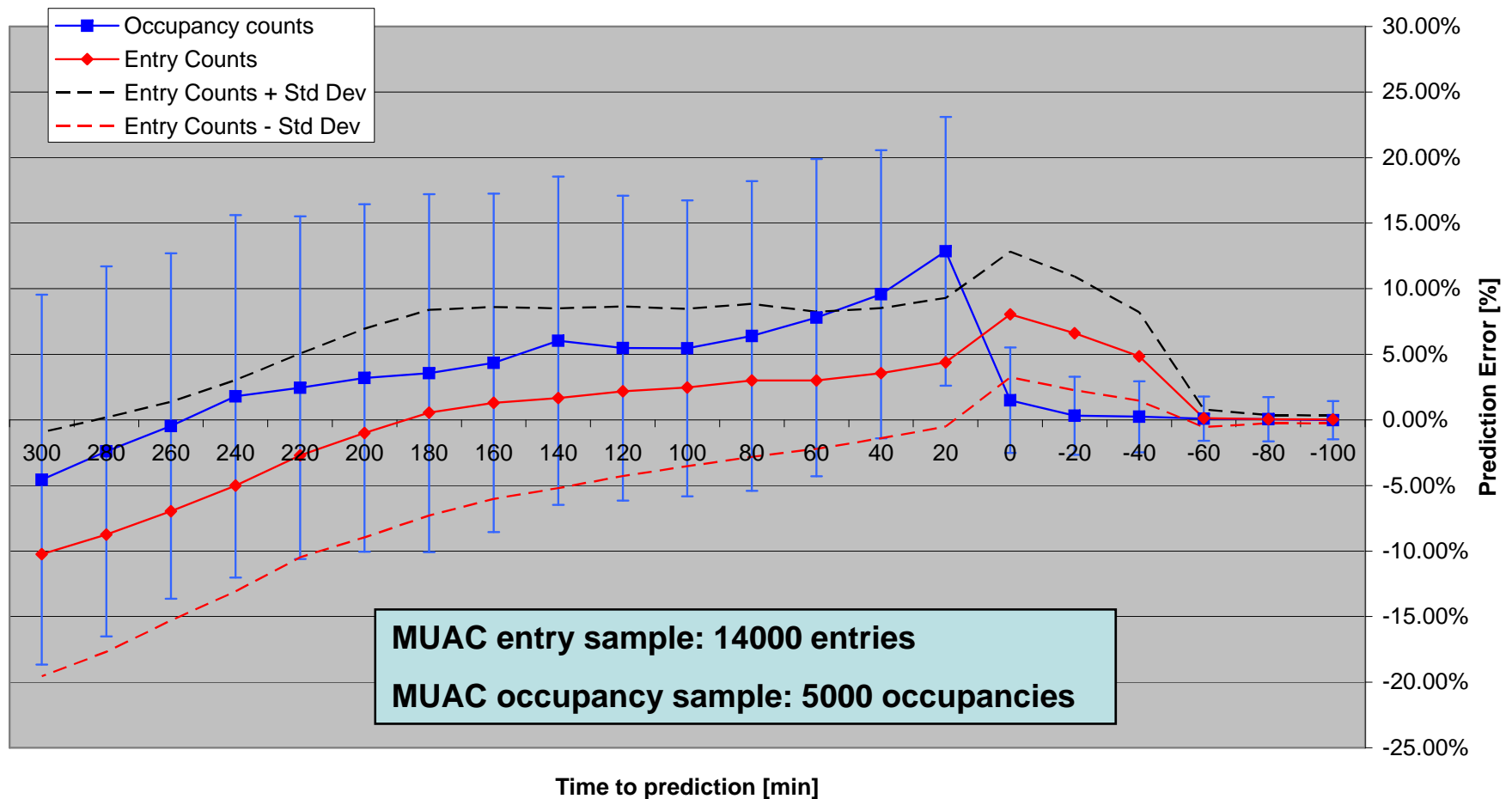
Dynamic DCB *in Brief*





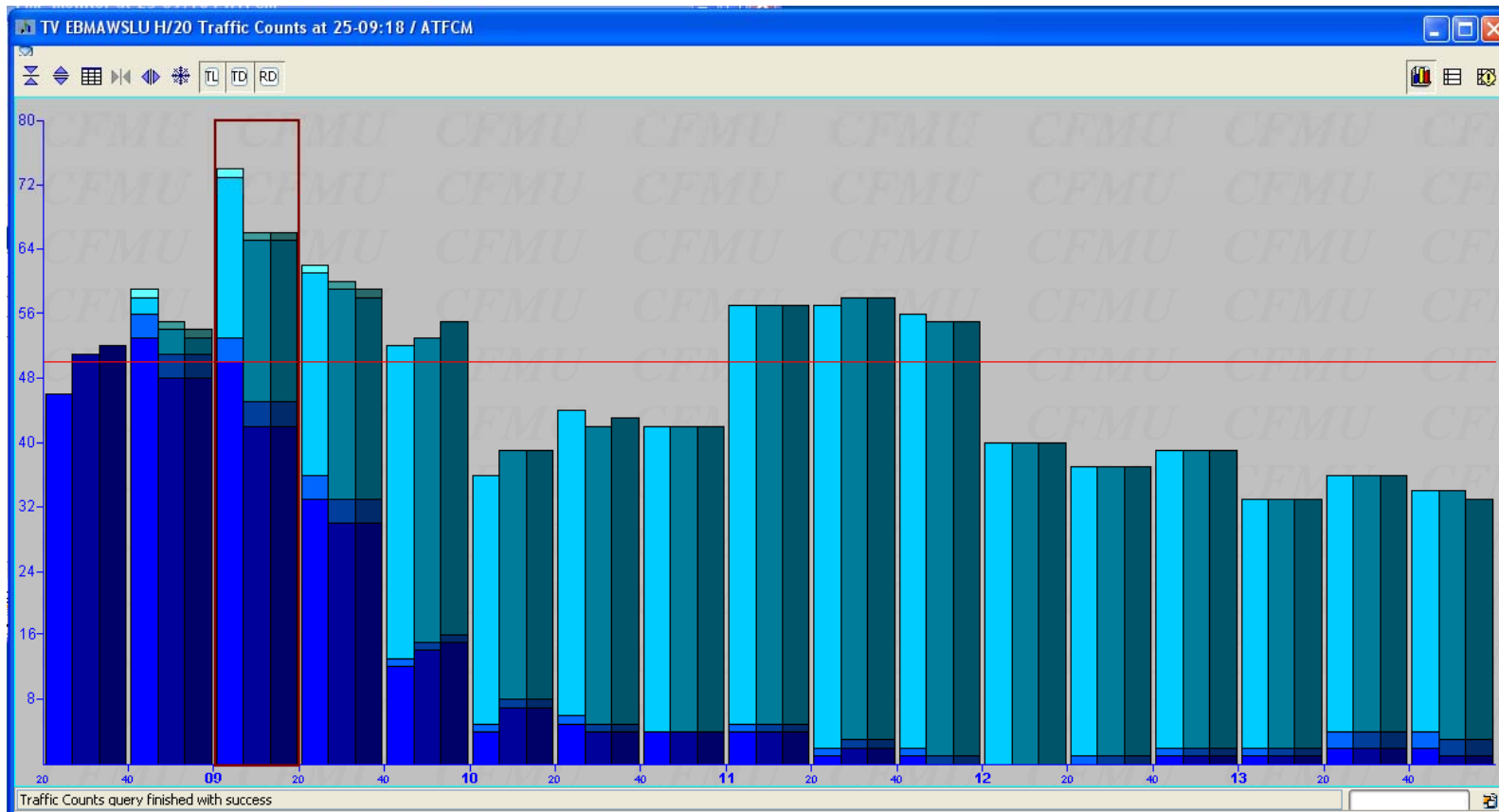
Traffic Prediction (Occupancy Count) is the cornerstone to take decision with confidence

MUAC Occupancy counts prediction error compared to entry counts prediction error

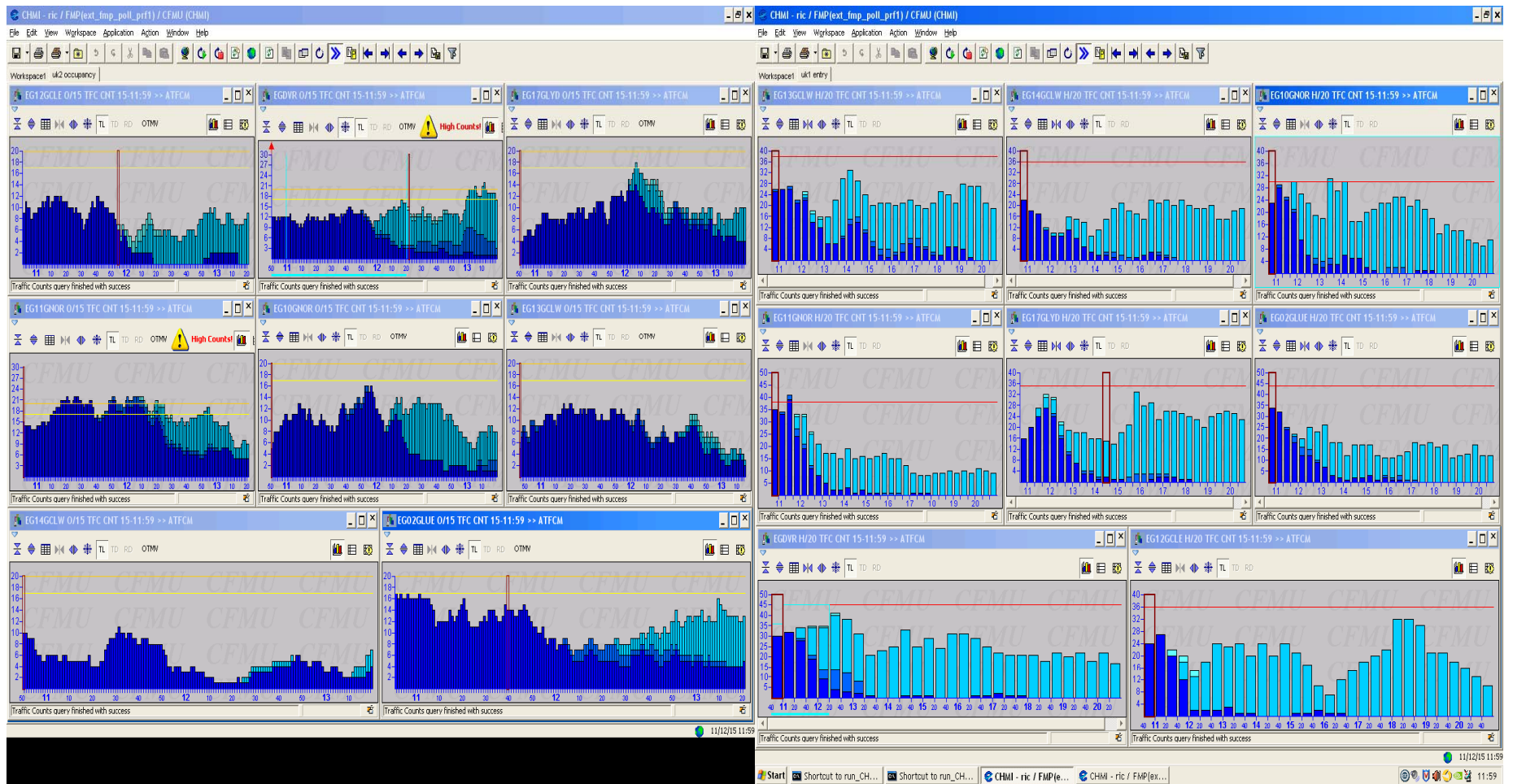


What is dDCB?

Entry Counts

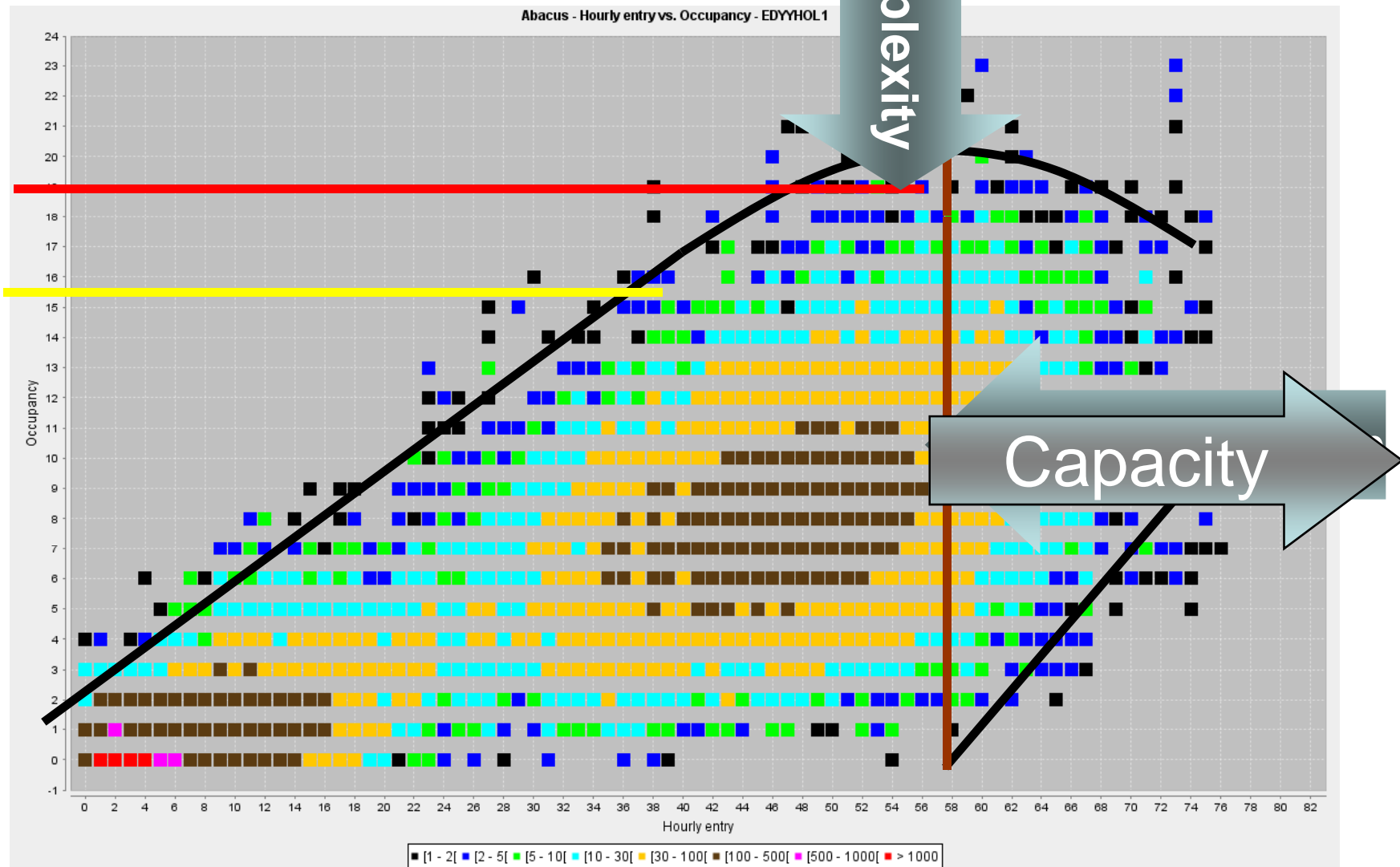


Entry versus Occupancy



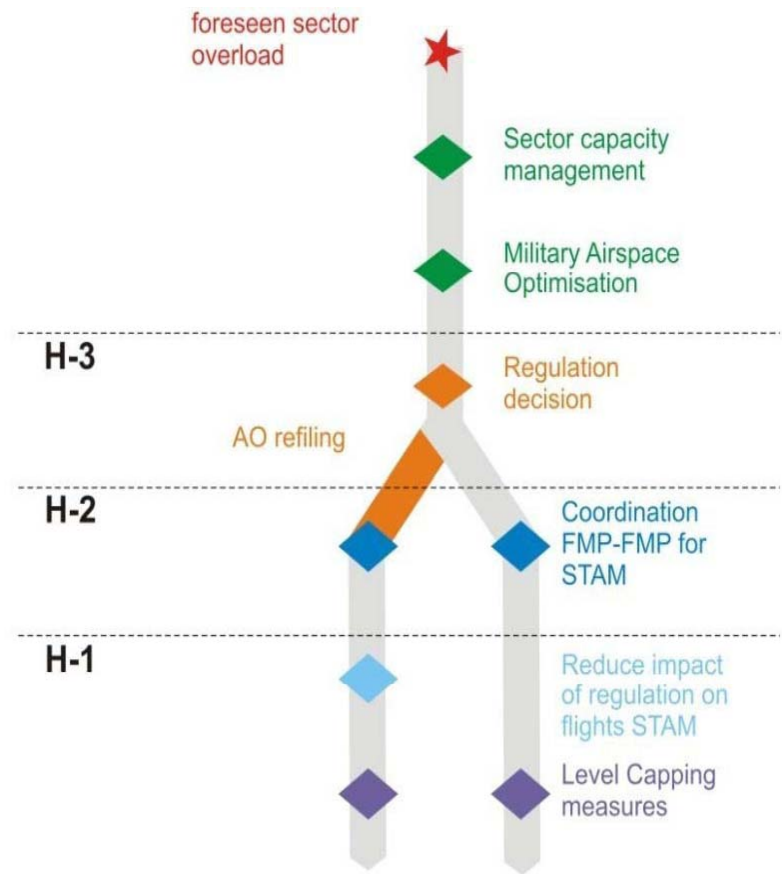
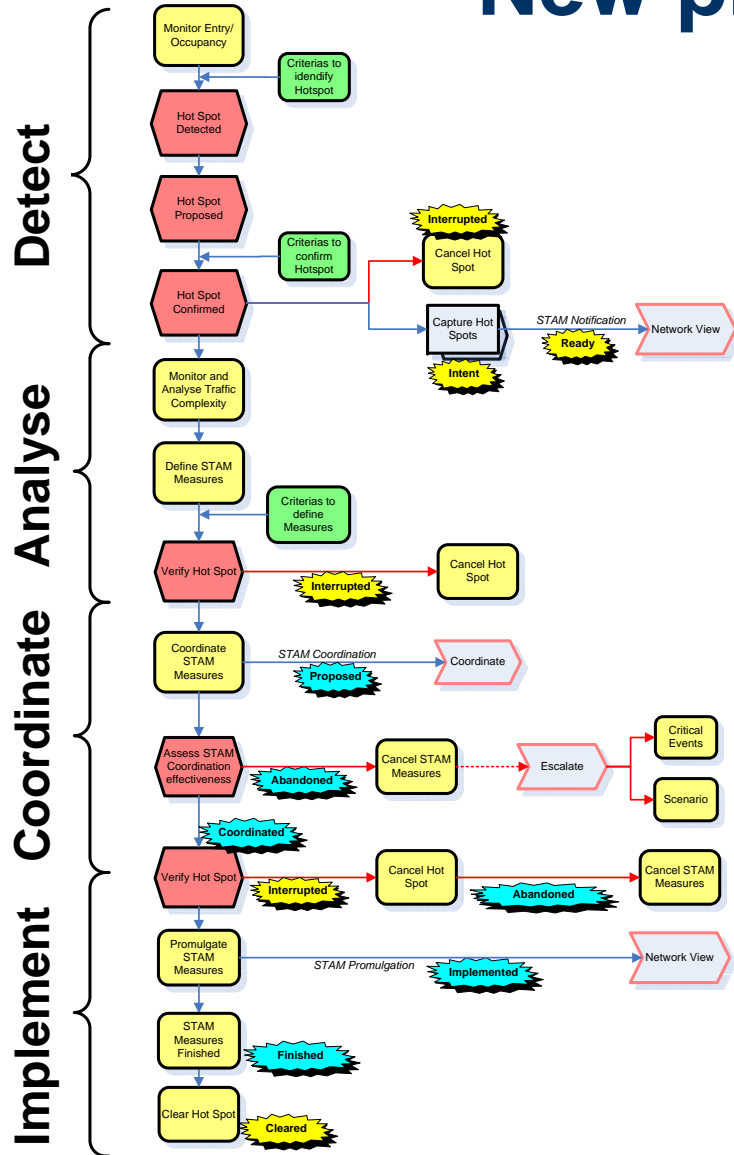


Hourly Capacity Versus dDCB



Concept Clarification

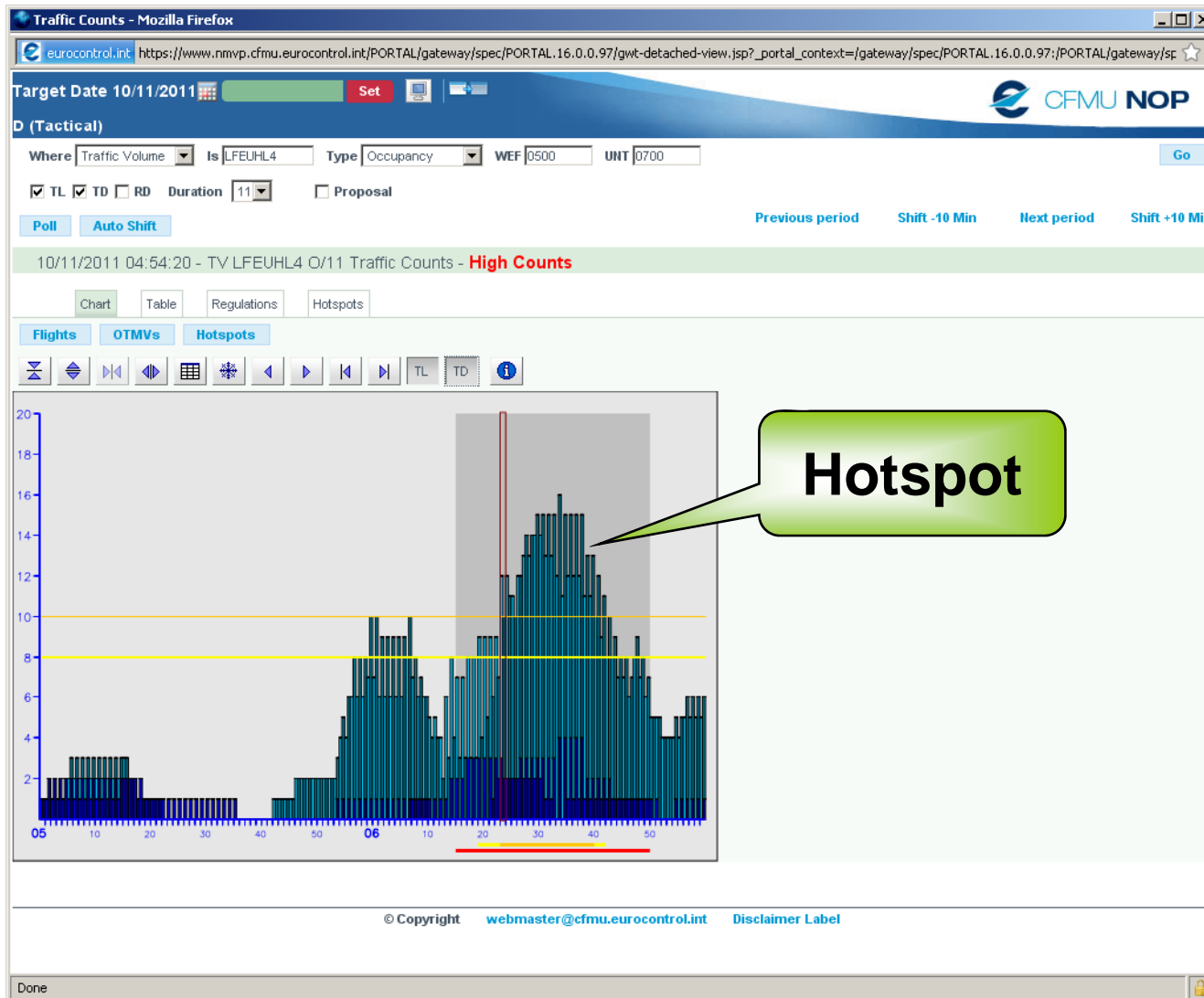
New process and procedures





Situation awareness

Network view: Hotspots



Situation awareness

Network view: Hotspots

Flight List - Mozilla Firefox

eurocontrol.int https://www.nmvp.cfm.eurocontrol.int/PORTAL/gateway/spec/PORTAL.16.0.0.91/gwt-detached-view.jsp?_portal_context=/gateway/spec/PORTAL.16.0.0.91:/PORTAL/gateway/sp

Target Date 25/10/2011

CFMU NOP

D (Tactical)

ARCID Aerodrome Aerodrome Set Aircraft Operator Airspace Point Regulation Traffic Volume Hotspot

Aerodrome: EGLL Category: Arrival (AO): BAW Traffic Type: Traffic Demand WEF: 1700 UNT: 1900

Traffic Type: D. Time Threshold: 0 D. Level Threshold: 0 D. Pos Threshold: 0

Previous Period Next Period

25/10/2011 15:40:49 - 87 flights

Hotspots

Plot Selected Flights

	TOT/TA	#H	STA	APR	ATYP	ADEP	ADES	D	T	RFL	IOBT	U	E/CTOT	X	F	S	A/TTOT	AT	Delay	R	Opp	W	MSG	REGUL+	O	Impacted
<input type="checkbox"/>	17:49E	1		BAW19LX	A319	ELLX	EGLL	I		380	25-16:50		16:55E	N	I			STANDARD		N	A				MSG	
<input type="checkbox"/>	18:10E	1	LF	BAW238	B772	KBOS	EGLL	A		410	25-12:15		12:35E	N	I	12:22	STANDARD		N	A						
<input type="checkbox"/>	18:24E	1		BAW337	A320	LFPO	EGLL	I		240	25-17:30		17:40E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:40E	1		BAW349	A320	LFMN	EGLL	I		380	25-17:05		17:13E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:20E	1		BAW35CE	A320	LFMN	EGLL	I		360	25-16:45		16:53E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	17:36E	1		BAW375	A320	LFBO	EGLL	I		360	25-16:05		16:15E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:17E	1		BAW399	A319	EBBR	EGLL	I		180	25-17:20		17:32E	N	I	17:32e	CDM		N	A					MSG	
<input type="checkbox"/>	18:37E	1		BAW39YL	A319	LFLL	EGLL	I		360	25-17:25		17:33E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:08E	0		BAW441	A321	EHAM	EGLL	I		240	25-17:10		17:24E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	17:15E	0		BAW465	A320	LEMD	EGLL	A		360	25-15:20		15:35E	f	I	15:37	STANDARD		N	A						
<input type="checkbox"/>	18:52E	1		BAW471IL	A320	LIML	EGLL	I		360	25-17:10		17:25E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:59E	1		BAW557	A320	LIRF	EGLL	I		360	25-16:45		17:00E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	17:31E	1	LU	BAW559	A321	LIRF	EGLL	T		340	25-15:15		15:30E	S	I	15:35	STANDARD		N	A						
<input type="checkbox"/>	18:38E	1		BAW567M	A320	LIMC	EGLL	I		380	25-17:00		17:15E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	17:31E	1		BAW59G	A319	LFBS	EGLL	I		380	25-16:20		16:27E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:25E	1		BAW61M	A320	LEMD	EGLL	I		360	25-16:30		16:45E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:25E	0		BAW663	B763	LCLK	EGLL	A		340	25-13:40		13:55E	N	I	13:55	STANDARD		N	A						
<input type="checkbox"/>	18:29E	1	LU	BAW677	A320	LTBA	EGLL	A		360	25-14:35		14:55E	N	I	14:44	STANDARD		N	A						
<input type="checkbox"/>	18:56E	1		BAW719	A319	LSZH	EGLL	I		380	25-17:30		17:45E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:00E	0		BAW735	A320	LSGG	EGLL	I		360	25-16:45		16:55E	N	I		STANDARD		N	A					MSG	
<input type="checkbox"/>	18:54E	0	LU	BAW781C	B763	ESSA	EGLL	I		360	25-16:40		16:50E	N	I		STANDARD		N	A					MSG	

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Done



STAM Scenarios



MEMBER OF
SESAR
JOINT UNDERTAKING



Scenario proposals for the P7.6.5 release one trial With example operational work flow

4. Level cap, present an Aircraft into a different sector to that originally planned to solve a high demand/workload issue.

Example: a) LTMA departure routing via the Brussels sector family group
Capped out of Brussels High.
b) UK North departure routing via the DECO sector family group
capped out of DECO High.

Work Flow:

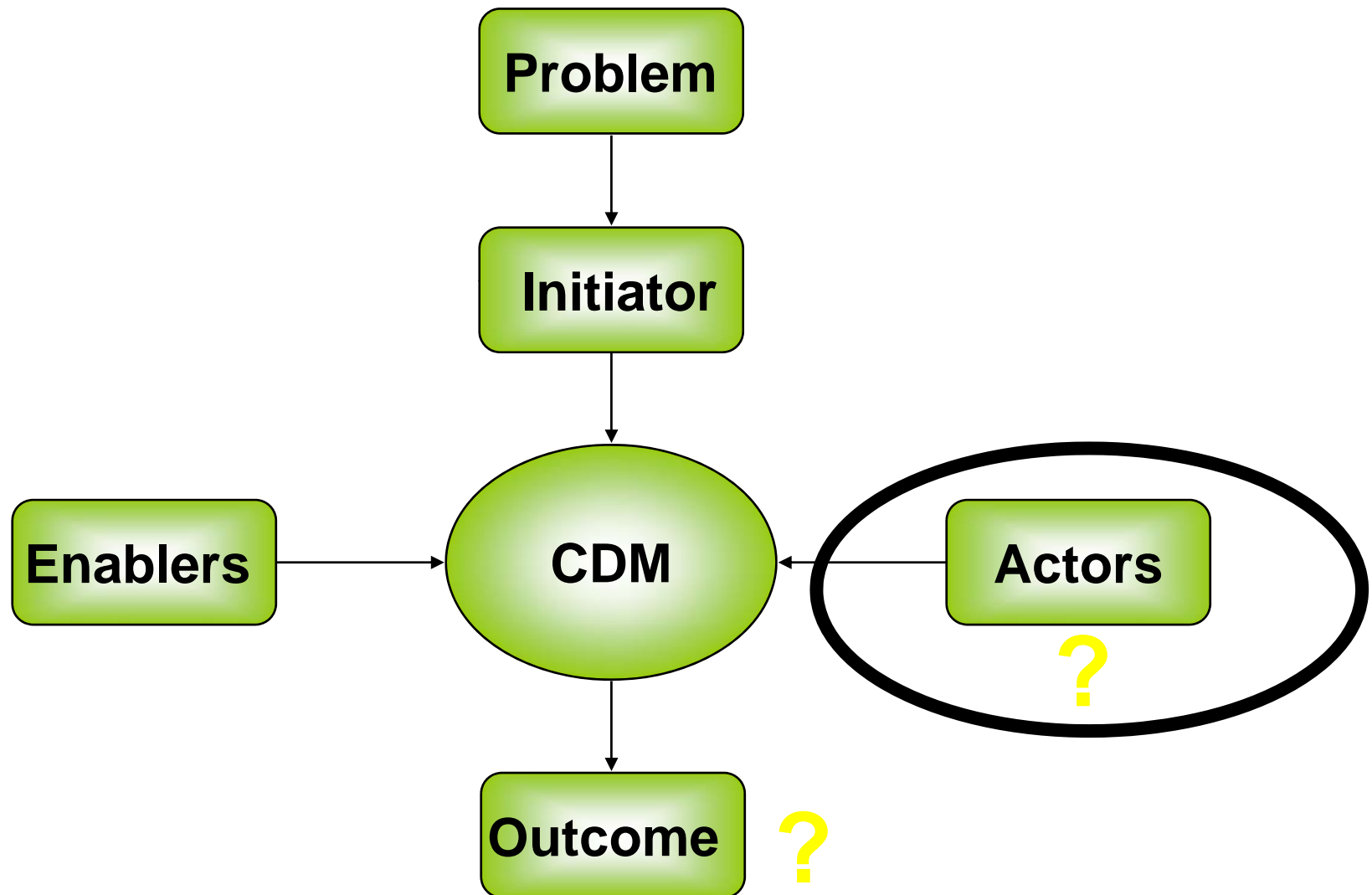
Initiate - Maastricht Flow Manager identifies a short period of excessive demand/workload within the Brussels sector family group at around T-1.5 to 1 hour. The FM then carries out an initial assessment to generate a list of potential dDCB solutions. The FM then initiates a "Hot Spot" to include the appropriate relevant actors in this instance UK FM.

Negotiate - Communication is initiated between the two FM's and the potential dDCB solutions are discussed. The optimum solution is identified as a level cap scenario between the actors then the UK FM then performs a DCB analysis to assess viability, upon approval communication with the relevant AOC's commences.

The AOC's then perform a business analysis to assess viability (which may result in acceptance, scenario modification or new dDCB solutions being applied as appropriate).

Implement - The optimised solution is confirmed, at which point ownership of the solution transfers to the UK FM. Implementation is achieved when the dDCB plan has been effectively communicated and agreed with the relevant ATC actors within London (and potentially new flight plans have been filed or a level cap scenario restriction has been applied by the appropriate CASA position within DNM).

dDCB CDM process





Identification of actors

Air Navigation Units model

3.2.4 Unit Classification overview

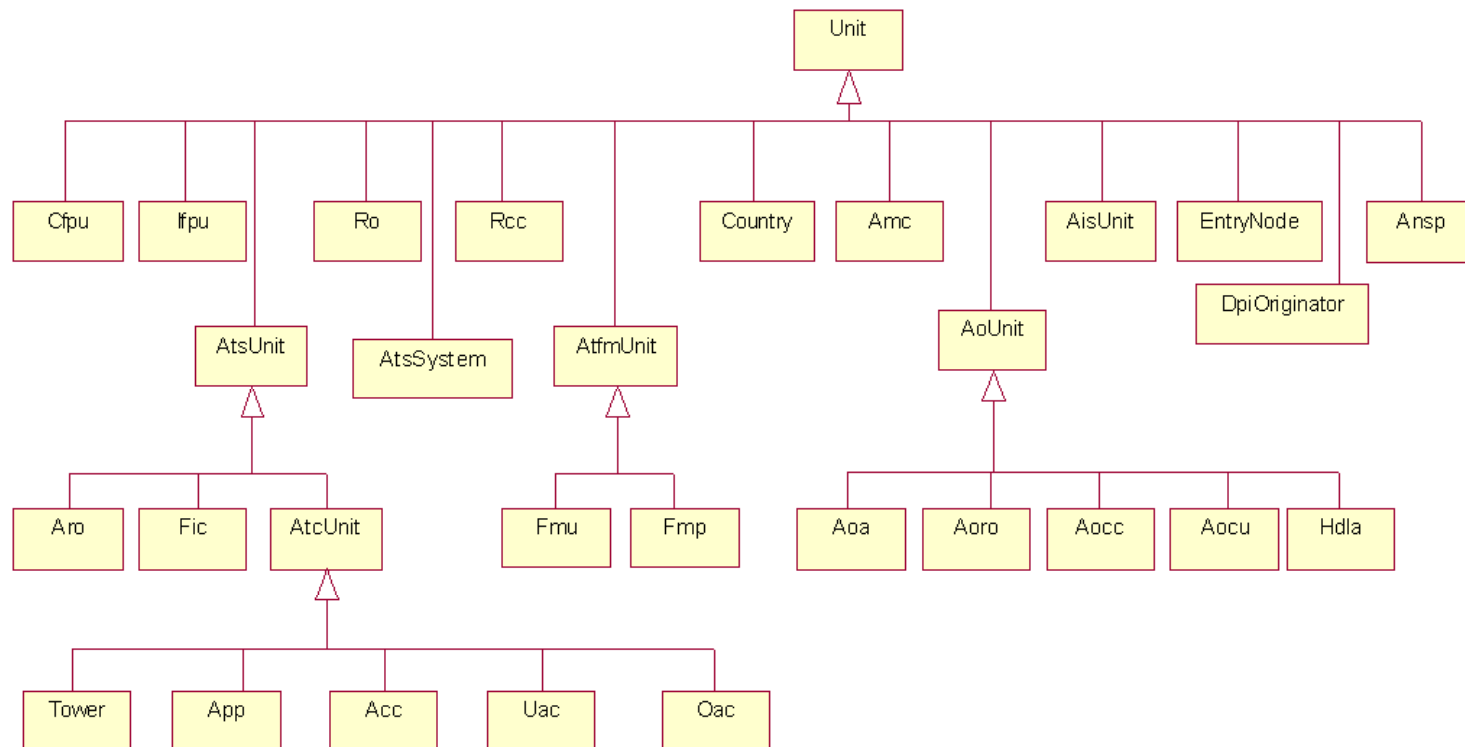


Figure UT-15: Unit Classification overview

3.16 AtcUnit

3.16.1 Description

- (1) An AtcUnit is a Unit responsible for providing ATC (Air Traffic Control) services for a AtcUnitAirspace (Aua).
- (2) Motivation:
- (3) AtcUnit is a generic concept that groups related types of Units.

3.16.2 Structure

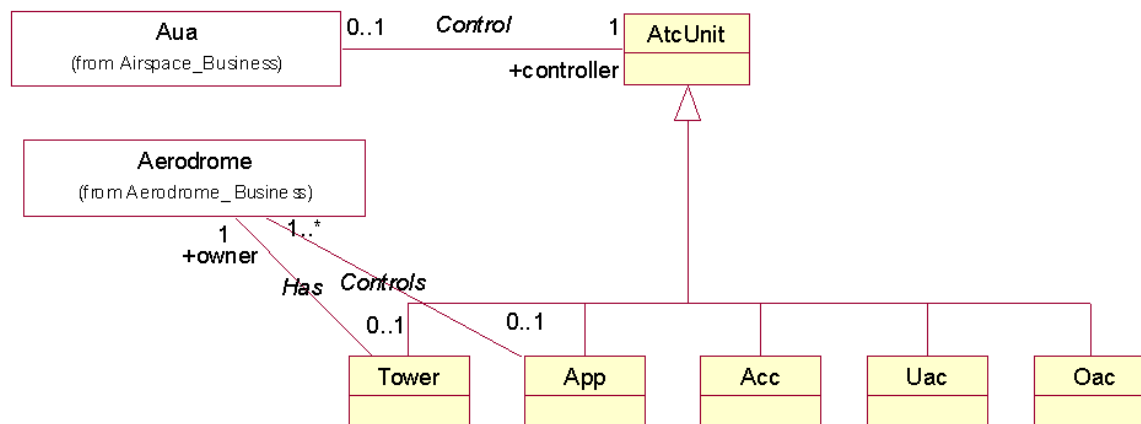


Figure UT-21: AtcUnit

3.2.3 Unit - Airspace overview

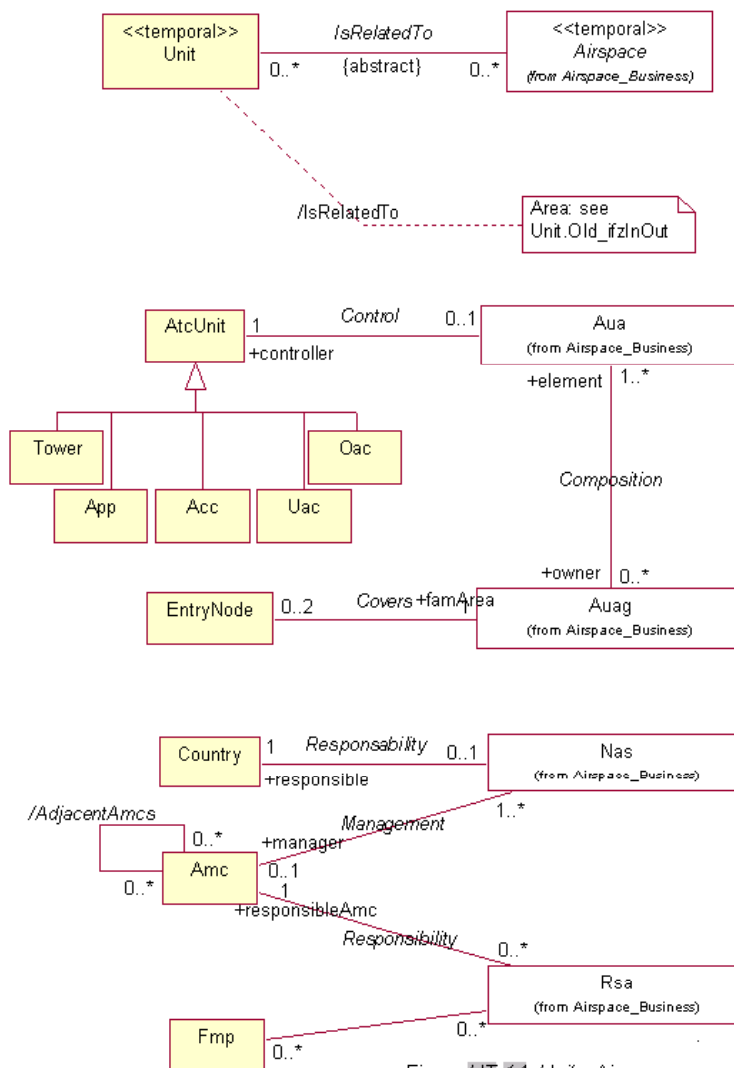
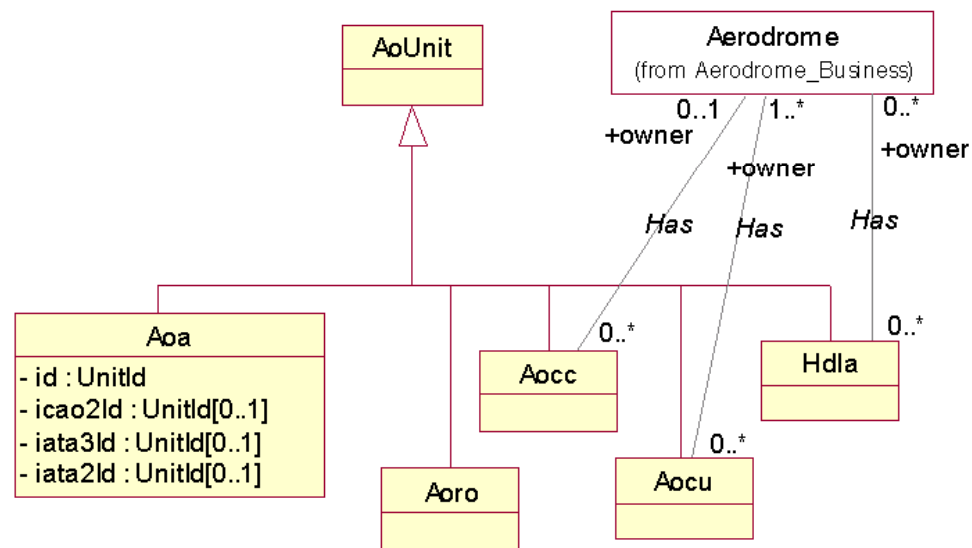


Figure UT-14: Unit - Airspace overview



Aoa: the AircraftOperatingAgency Unit represents the main office of an aircraft operator.
Aoro: an AircraftOperatorRplOffice is a department of an Aoa.
Aacc: an AircraftOperatorControlCentre is a centre for an Aoa.
Aocu: an AircraftOperatorControlUnit is a local office representing one Aircraft operator at an Aerodrome.
Hdla: a HandlingAgent is an agent acting on behalf of one or more Aoa.

Figure UT-19: Aoa

3.7 Amc

3.7.1 Description

- (1) An Amc is a Unit which is responsible for the opening and closure of routes to implement the Flexible Use of Airspace concept.

3.7.2 Structure

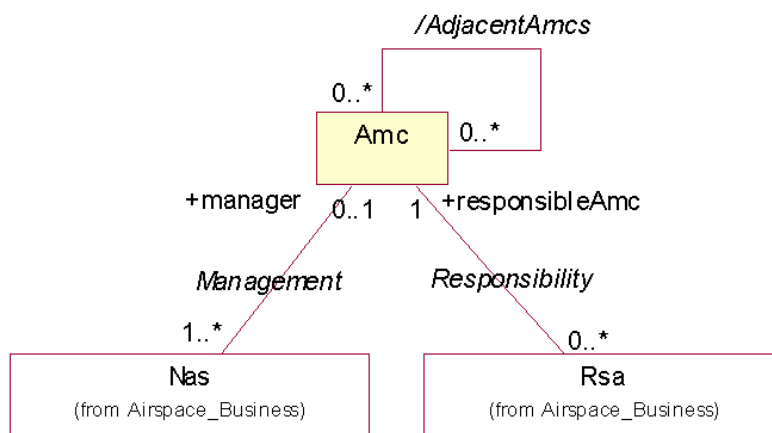
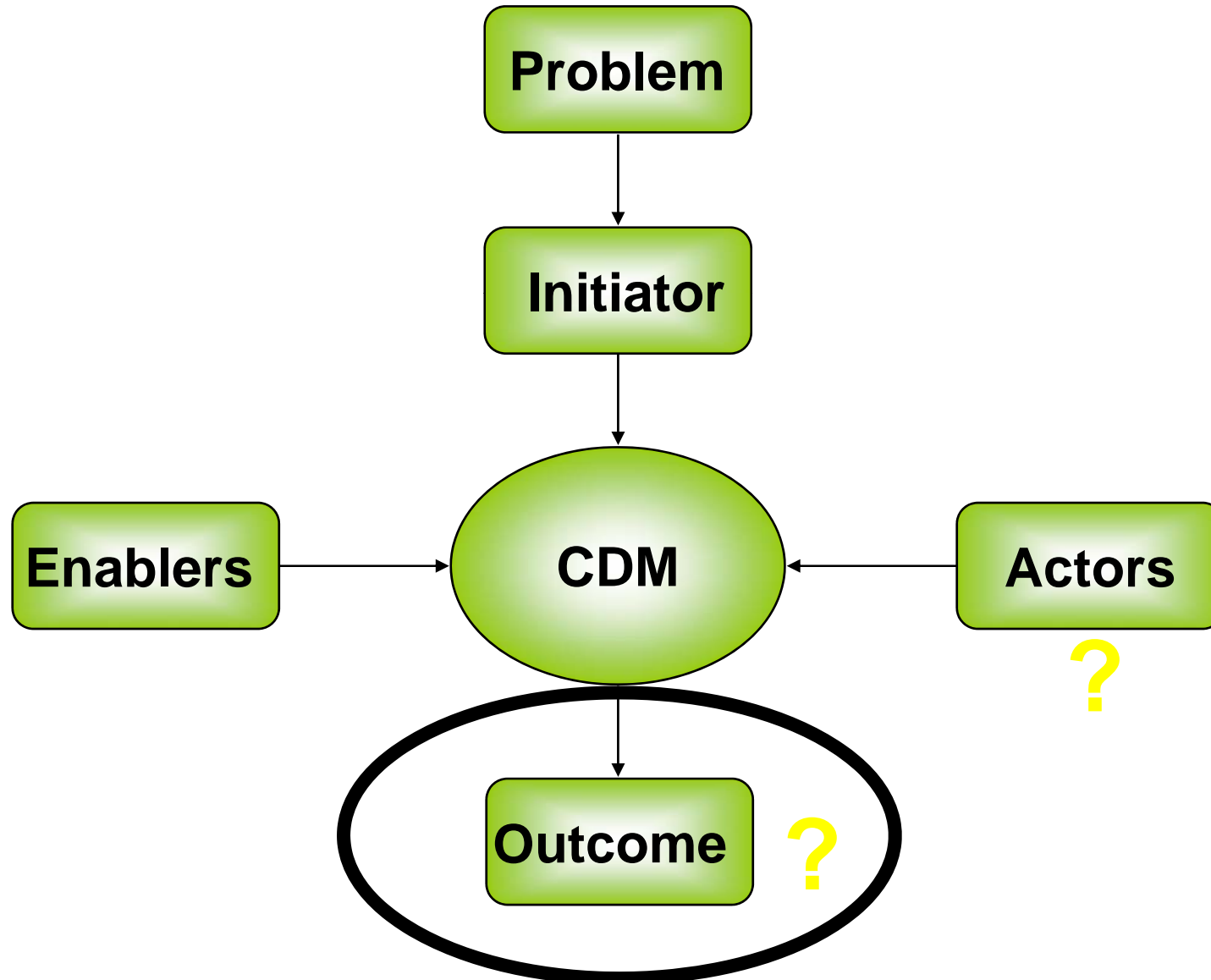
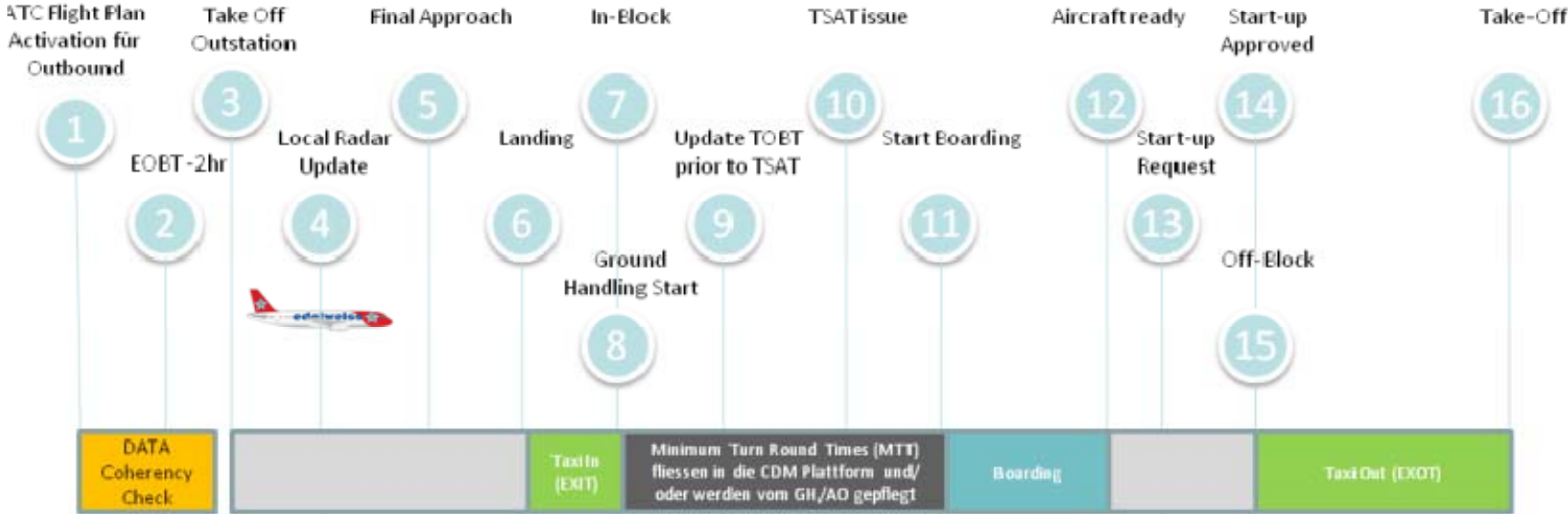


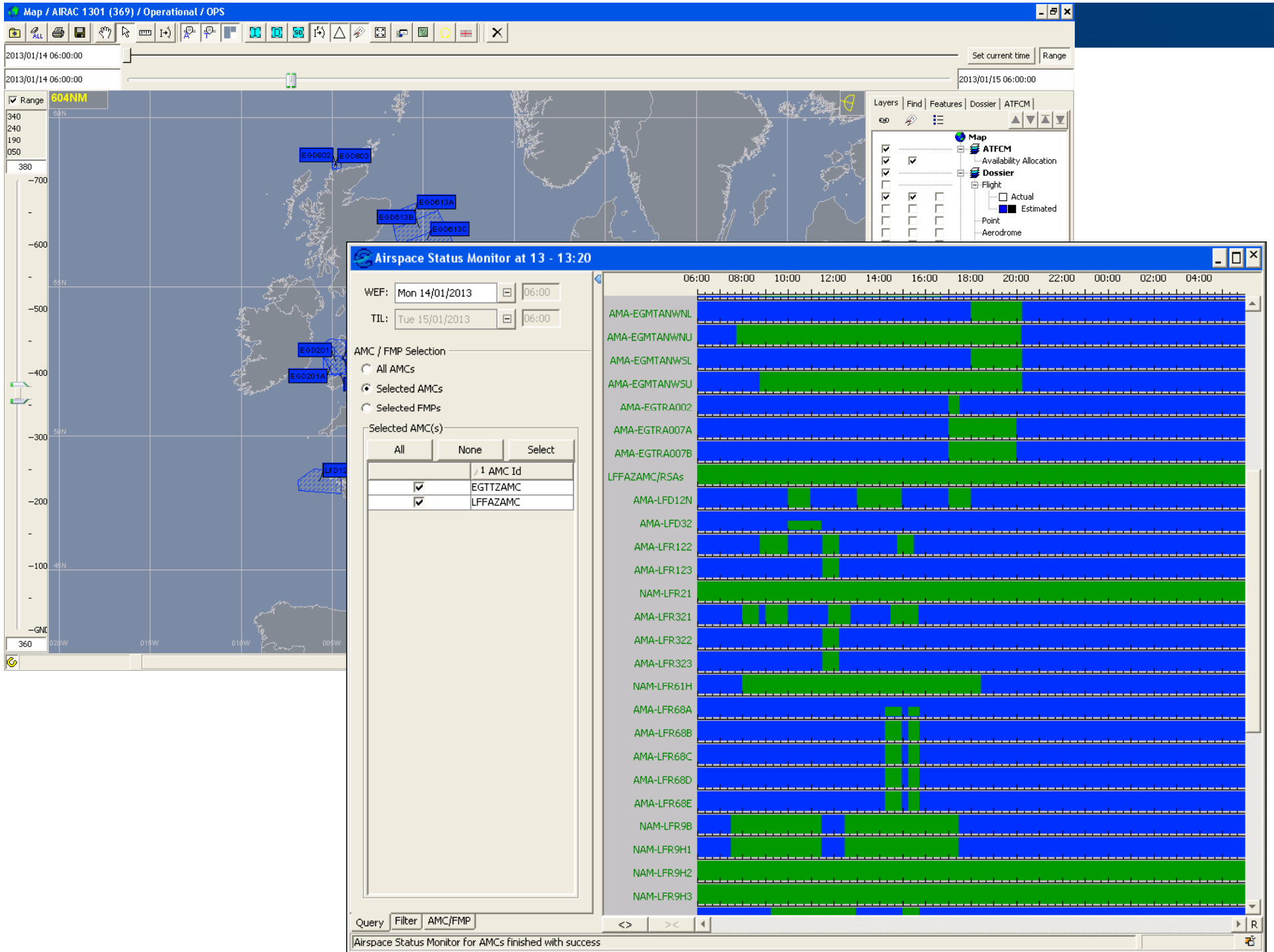
Figure UT-17: Amc

dDCB CDM process



INBOUND Turn-Round A/C Ready **Outbound**







AUA EDYYDUTA ATC Configuration at 14-09:45 / ATFCM

Observed period:

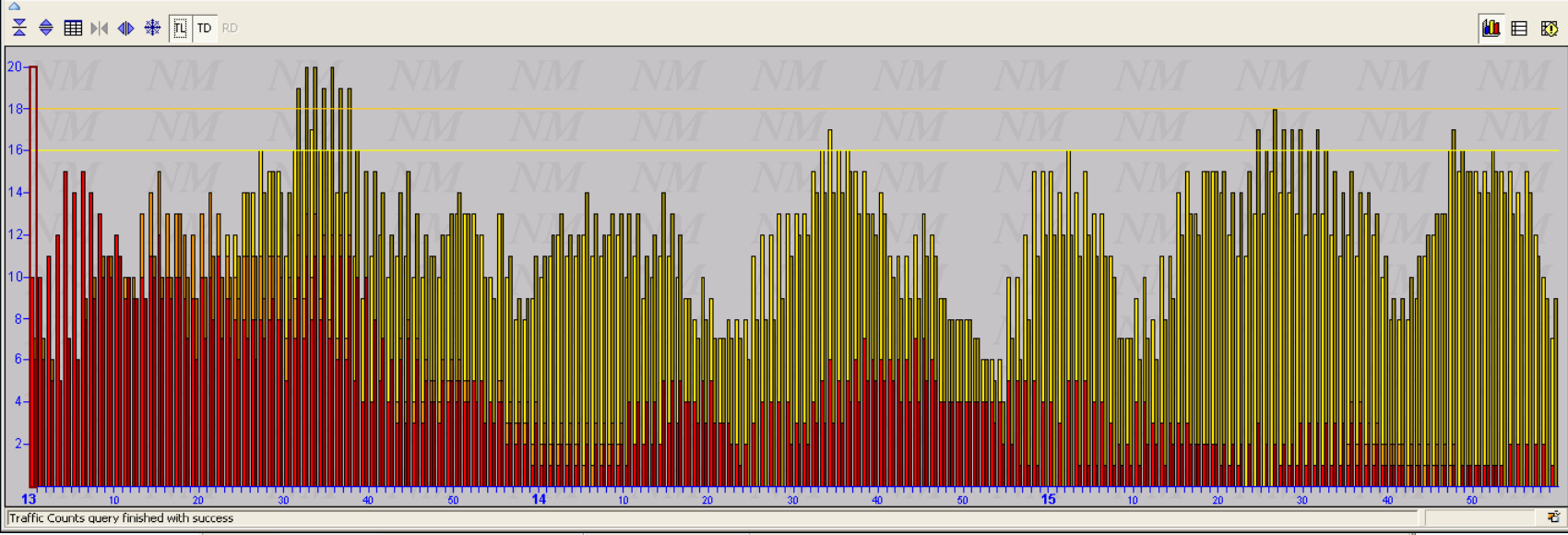
for AUA or Cluster:

ATC Configuration		Activation	
Configuration	Airspace	From - To	Configuration
CNF1	EDYYDELHI	0000-0530	CNF1
CNF2	EDYYDELLO	0530-0600	CNF2
CNF3.1	EDYYHOL	0600-0700	CNF3.2
CNF3.2	EDYYJEV	0700-0830	CNF4.1
CNF3.3		0830-0930	CNF3.1
CNF4.1		0930-1030	CNF4.1
CNF4.2		1030-1200	CNF3.2
CNF4.3		1200-1330	CNF3.1
CNF4.4		1330-1430	CNF4.1
CNF4.5		1430-1600	CNF3.1
CNF4.6		1600-1800	CNF4.1
CNF5.1		1800-1900	CNF3.1
CNF5.2		1900-2000	CNF4.1
CNF5.3		2000-2100	CNF3.2
CNF5.4		2100-2200	CNF2
CNF5.5		2200-0000	CNF1
CNF6			

Atc Configuration query finished with success

TV EDMURH2 O/I Traffic Counts at 13-12:55 / ATFCM

WEF 13:00 UNT 16:00
 Where Traffic Volume Is EDMURH2
 Type Occupancy TL TD RD Duration 1



Traffic Counts query finished with success

READY Flights Only Show Predicted Flights FLS 241 flights

ENTRY	STA	ARCID	ATYP	ADEP	ADES	D	T	ARF	IOBT	U	E/CTOT	X	F	S	M	AT	TV	A/TTOT	Delay	E/C/ATA	R	Opp	W	MSG	REGUL+	0	TI	EFL	TO	
11:24A		WGT11H	A319	EDVE	KPTK	A	360	10:45	10:48E		a	I	S					10:58		19:32A	N	N						=	360	=
11:24A		RVR8012	B738	EPWA	EIDW	A	380	09:40	09:50E		f	I	S					10:05		12:29A	N	N						=	380	=
11:25A		QTR045	A332	OTBD	EGCC	A	400	04:40	04:50E		f	I	S					05:19		12:21A	N	N						=	400	=
11:27A		TAF762	A319	LPPT	ENGM	A	360	09:05	09:17E		N	I	S					09:14		12:53A	N	N						=	360	=
11:29A		BAW855	A320	LKPR	EGLL	A	380	10:45	10:55E		N	I	S	[10:4...				10:42		12:10A	N	N						=	380	=
11:32A	LU	RVR2525	B738	ESGP	LEMG	A	380	10:20	10:25E		a	I	S					10:41		13:59A	N	N						=	380	=
11:32A		BAW977	A320	EDVJ	EGLL	A	380	10:35	10:40E	NR	a	I	S					11:11		12:13A	N	N	FLS			/	361	=		
11:34A		RVR960L	B738	EPFK	EGPH	A	360	10:10	10:15E		f	I	S					10:22		12:40A	N	Y					=	360	=	
11:34A		MON7573	A320	EDDM	EGHH	A	380	10:55	10:50E		f	I	C					10:48a		12:25A	N	N					=	380	=	
11:36A		BGH5811	A320	LBSF	EDCC	A	360	08:45	09:00E		a	I	S					09:24		12:34A	N	N					=	360	=	
11:36A		XLFI66	B738	LFPG	ESSA	t	370	11:00	11:18E		F	I	C					12:14s		13:21A	N	N					=	370	=	
11:40A	LU	NAK2EH	B738	ESSA	LEAL	A	360	10:15	10:30E		N	I	S					10:24		13:48A	N	N					=	360	=	
11:41A		NAK2WU	B738	GCLP	ESSA	A	370	07:45	07:55E		N	I	S					07:54		13:26A	N	N					=	370	=	
11:41A		QTR011	B77W	OTBD	EGLL	A	360	04:50	05:00E		f	I	S					05:47		12:19A	N	N					=	360	=	
11:45A		DLH962	A321	EDDF	EGPH	t	360	11:05	11:22E		F	I	C					12:24a		12:51A	N	N					/	358	=	
11:46E		BAW852	A320	EGLL	LKPR	I	370	11:00	11:20E		N	I	S							12:56E	N	N					=	345	=	
11:47A		YK66724	A321	GCTS	ENTO	A	350	07:20	07:30E		f	I	S					07:36		13:01A	N	N					/	345	=	
11:48A		EIM664	A320	EIDW	LOWW	A	370	10:50	11:01E		N	I	S					10:57		13:19A	N	N					=	370	=	
11:49A	LU	EZY489F	A319	EPFK	EGAA	A	360	10:20	10:25E		f	I	S					10:27		12:51A	N	N					=	360	=	
11:50A		EZY979C	A319	LKPR	EGSS	A	380	11:00	11:10E		N	I	S					10:59		12:30A	N	N					=	380	=	
11:51A		TAF762F	A321	LPPT	ESSA	A	360	09:10	09:22E		a	I	S					09:34		13:08A	N	N					/	355	=	
11:53A		AMN036	L335	PNBR	RYKX	T	380	11:00	11:05E		F	I	R					11:05		14:42A	N	N					=	380	=	
11:57A		FIM880Q	A321	LFPG	EPFK	t	350	11:20	11:39E		F	I	C					12:34s		14:13A	N	N					=	350	=	

IOBT: 13/01/2013 - Last EOBT: 10:45 13/01/2013
 Flight Type: ACT /RFI
 Reroute Try and Apply NOT allowed
 Route: N0405F240 BALTU L984 DONAD/N0449F380 UL602 HMM U2302 GORLO UL980 LOGAN

FieldIS query finished with success



Time Line

Dash-Board
collaborative work to manage
multitude of time-based actions



What-if
performance driven



Graph Counts

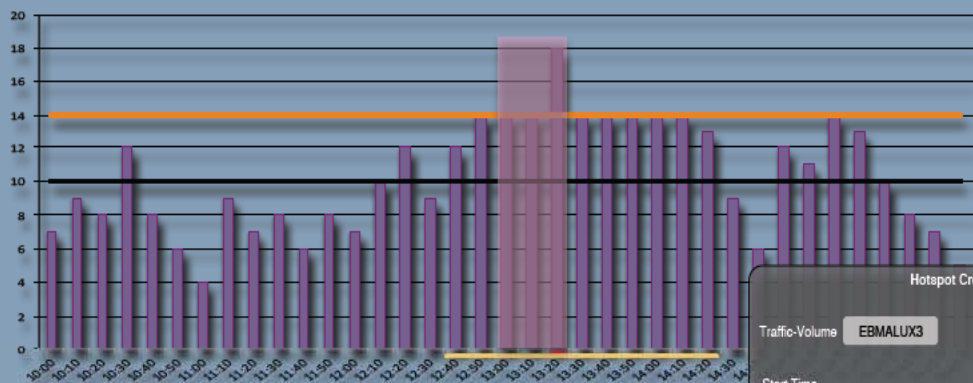
Flight List

FMP

TFV

Hotspot

WEF 10:00 UNT 16:00 Timestep 10 Timeslice 10 TV/AS EBMALUX3



Hotspot Creation

Traffic-Volume: EBMALUX3

Coordination Deadline: 13:00

Start Time: 13:00

End Time: 13:20

Hotspot Status: Draft Active

Buttons: Cancel, Apply

Unread	Subject	Requestor	Hotspot
	LC BAW2432	LSGG	LSGZXXX 06:50-07:20
	TCNB AFR12M	MUAC	EBMAKOK2 10:50-11:10
	Bad Weather on LPFG	LPFG	06:04

GENEVE said 65 min ago
Requests Level Capping on BAW2432

REIMS said 65 min ago
Level Capping on BAW2432 accepted

GENEVE said 62 min ago
Requests to be responsible for implementation

Hotspot: LSGZXXX 06:50-07:20

Responsible: MUAC

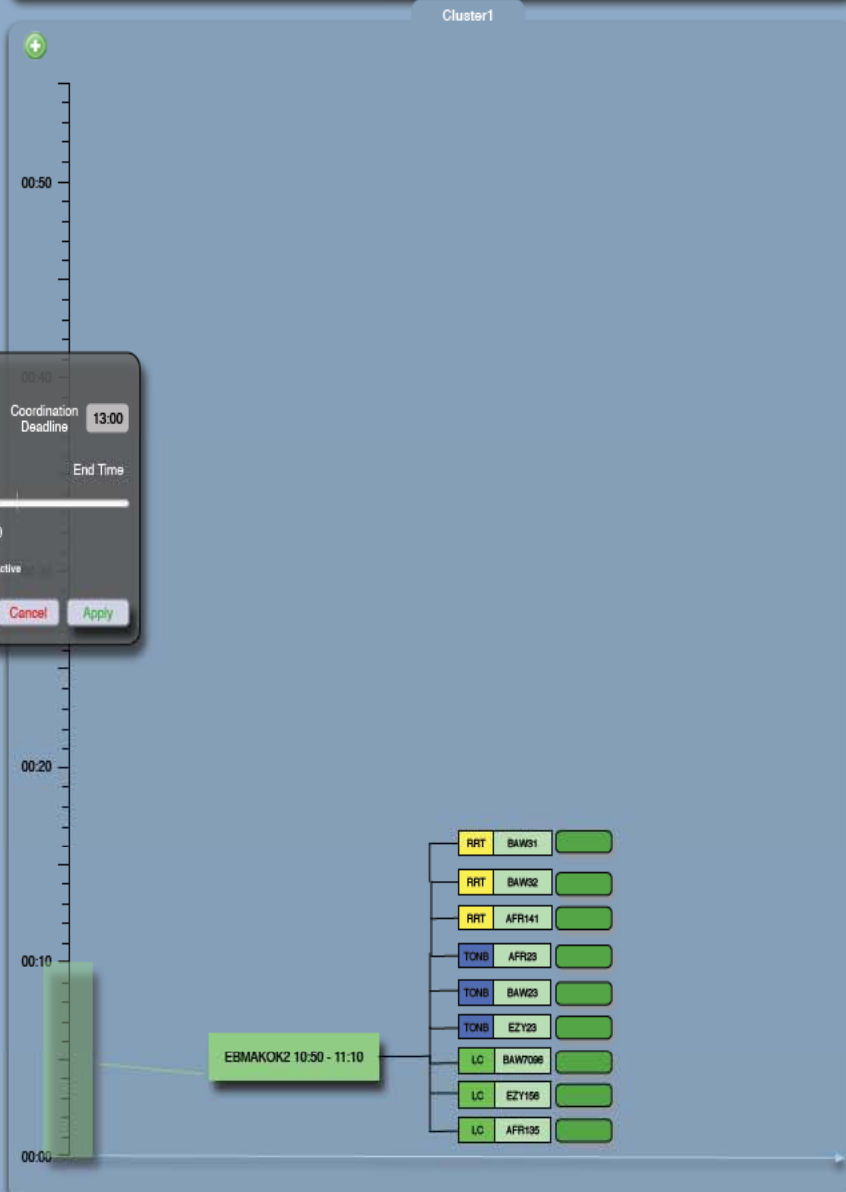
For Approval: REIMS, GENEVE

For Information: BAW

Buttons: Validate

Enter your message:

Buttons: Accept, Refuse, Attach new measure, Send



MUAC FMP - Day of Traffic: 30/09/2011

Graph Counts

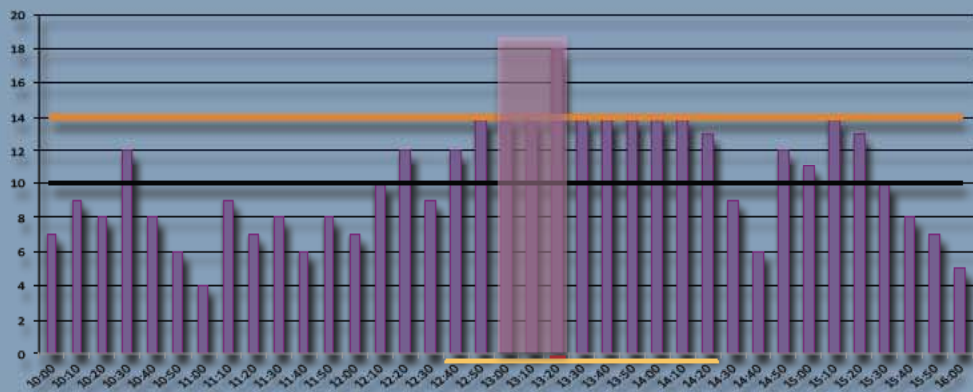
Flight List

FMP

TFV

Hotspot

WEF 10:00 UNT 16:00 Timestep 10 Timeslice 10 TVIAS Q EBMALUX3



Unsent	Subject	Requester	Hotspot	Time
	LC BAW2432	LSGG	LSGZXXX 09:50-07:20	08:12
	TONB AFR12M	MUAC	EBMAKOK2 10:50-11:10	08:08
	Bad Weather on LFPG	LFPG		06:04

GENEVE said 65 min ago
Requests Level Capping on BAW2432

REIMS said 65 min ago
Level Capping on BAW2432 accepted

GENEVE said 62 min ago
Requests to be responsible for implementation

Hotspot: LSGZXXX 06:50-07:20

Responsible: MUAC

For Approval: REIMS, GENEVE

For Information: BAW

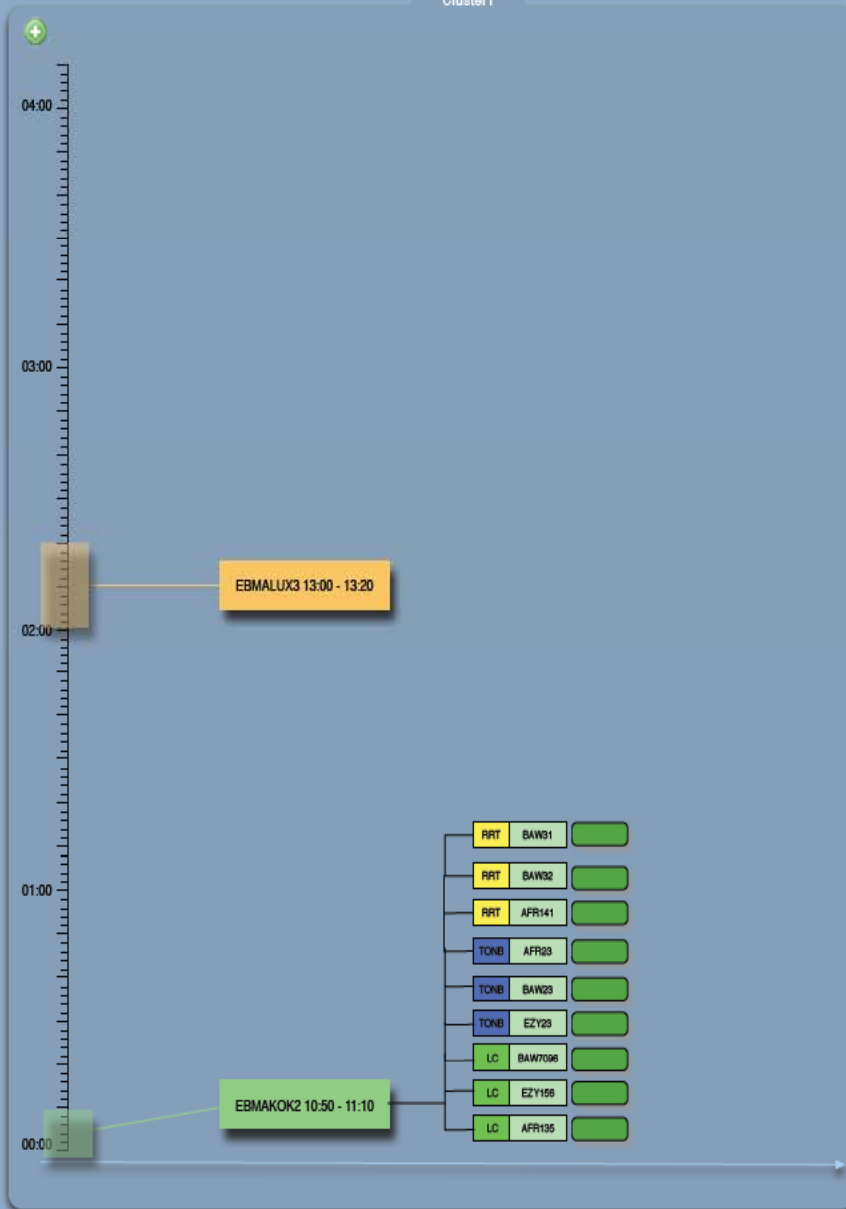
Validate

Enter your message:

Accept Refuse

Attach new measure Send

Cluster1



Graph Counts

Flight List

WEF 10:00

UNT 16:00

TVIAS EBMALUX3

STAM Editor

Priority	ADEP	ADEB	ARCID	Margine Cost	RPL	TTA	ΔTTA	Nb Hotspots	STAM	CTOT
P	EBBR	LFBO	IBE4217	68	280	12:50	+00:00	2	TCIB	13:01
	EBBR	LFBO	IBE4217	55	280	12:50	+00:00	1		13:01
	EBBR	LFBO	IBE4217	34	280	12:50	+00:00	1		13:01
	LML	EBBR	AFR7096	160	320	12:50	+00:03	1		13:01
	EBBR	LFBO	IBE4217	23	280	12:50	+00:01	1		13:01
	LSGG	EHAM	AFR54M	186	280	12:25	+00:00	1		12:35
P	EBBR	LFBO	IBE4217	65	280	12:50	+00:00	2	PRT	13:01
P	EBBR	LFBO	IBE4217	55	280	12:50	+00:01	1		13:01
	EBBR	LFBO	IBE4217	33	280	12:50	+00:00	1		13:01
	EBBR	LFBO	IBE4217	27	280	12:50	+00:02	1		13:01
	EBBR	LFBO	IBE4217	45	280	12:50	+00:02	1		13:01
	EBBR	LFBO	IBE4217	54	280	12:50	+00:01	1		13:01
P	EBBR	LFBO	IBE4217	76	280	12:50	+00:03	1		13:01
	EBBR	LFBO	IBE4217	63	280	12:50	+00:02	1		13:01

Unread	Subject	Requestor	Hotspot	Time
<input checked="" type="checkbox"/>	LC BAW2432	LSGG	LSGZXXX 06:50-07:20	06:12
<input checked="" type="checkbox"/>	TONB AFR12M	MUAC	EBMAKOK2 10:50-11:10	06:08
<input checked="" type="checkbox"/>	Bad Weather on LFPG	LFPG		06:04

GENEVE said 65 min ago
Requests Level Capping on BAW2432

REIMS said 65 min ago
Level Capping on BAW2432 accepted

GENEVE said 62 min ago
Requests to be responsible for implementation

LC BAW2432
LC1 - FL250

Hotspot: LSGZXXX 06:50-07:20

Responsible: MUAC

For Approval: REIMS, GENEVE

For Information: BAW

Validate

Enter your message:

Accept Refuse

Attach new measure Send

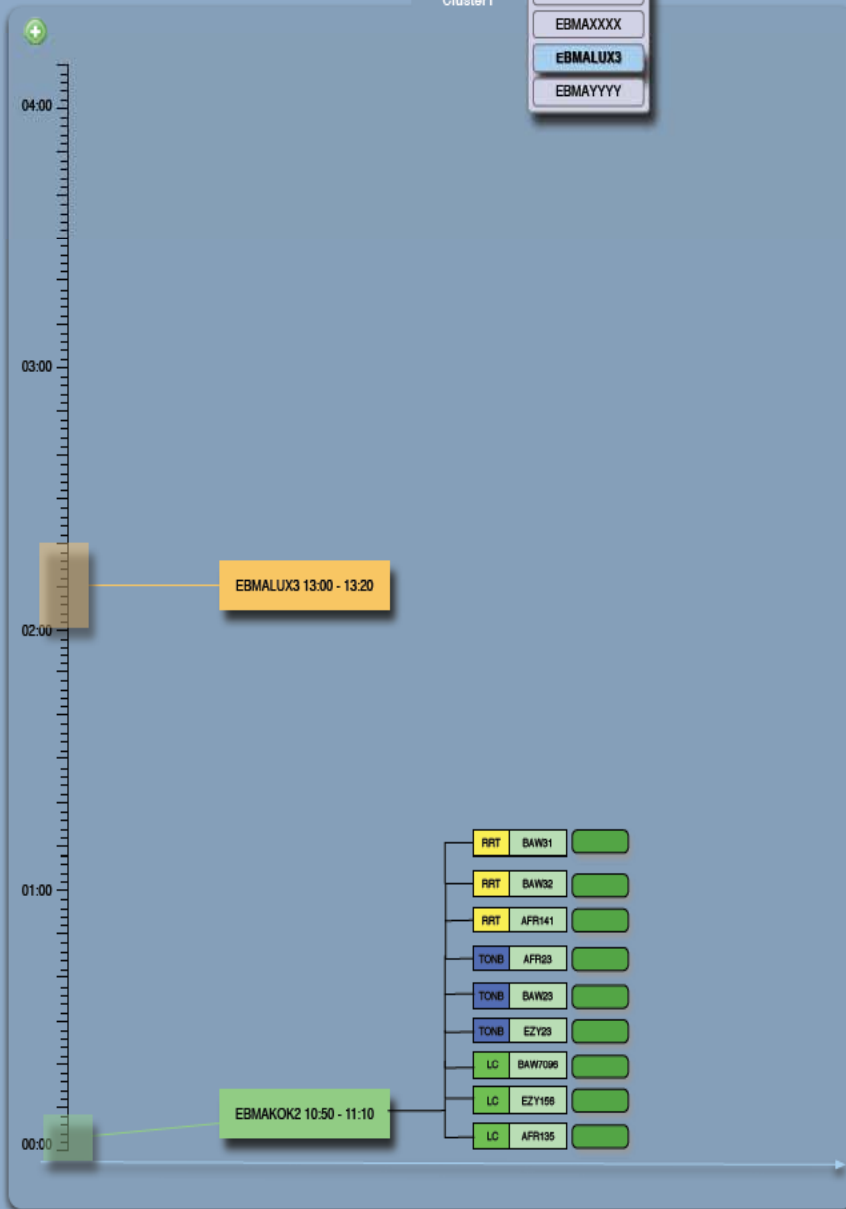
FMP

TFV

Hotspot

Cluster1

- EBMAKOK2
- EBMAXXXX
- EBMALUX3**
- EBMAYYYY



Graph Counts

Flight List

FMP

TFV

Hotspot

WEF 10:00

UNT 16:00

TVIAS EBMALUX3

STAM Editor

Cluster1

EBMALUX3 13:00-13:20

Preparation

Coordination

Coordinated

For Implementation

STAM Measure Editor

STAM Editor

Group Editor

Flow Editor

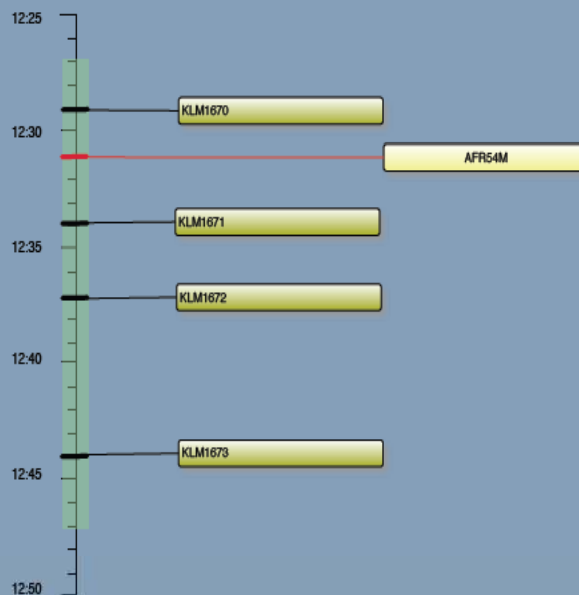
Scenario Editor

REROUTING LEVEL CAP. MCH MIT TONB

- PRT AFR1401
- R1 - Avoid S2
- LC AFR7098
- LC1 - FL380

EDIT APPLY SAVE DELETE RESET DASHBOARD

AFR54M



History Display

R1 avoid S2

Priority	ADEP	ADES
P	EBBR	LFBO
	EBBR	LFBO
	EBBR	LFBO
	LML	EBBR
	EBBR	LFBO
	LSGG	EHAM
P	EBBR	LFBO
P	EBBR	LFBO
	EBBR	LFBO
	EBBR	LFBO
	EBBR	LFBO
	EBBR	LFBO
P	EBBR	LFBO
	EBBR	LFBO

- Unveid
- Subject
- LC BAW2432
- TONB AFR12M
- Bad Weather on LFP

- GENEVE said 65 min ago
Requests Level Capping on BAW2432
- REIMS said 65 min ago
Level Capping on BAW2432
- GENEVE said 62 min ago
Requests to be responsible for implementation

Enter your message:

Accept
Refuse

Attach new measure
Send

Graph Counts

Flight List

FMP

TFV

Hotspot

WEF 10:00

UNT 16:00

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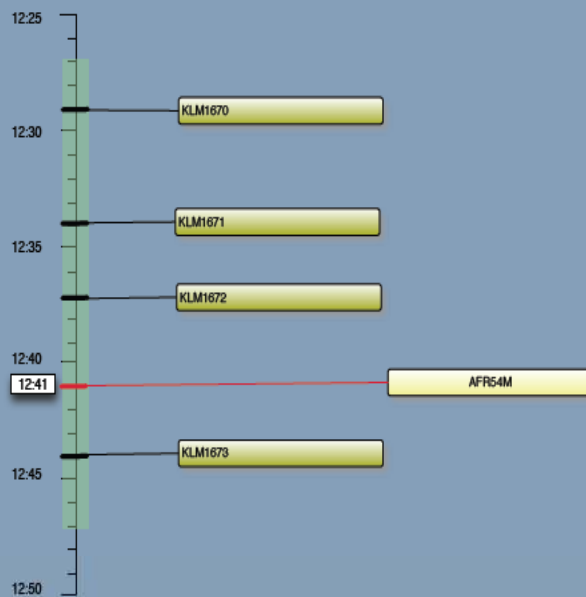
Scenario Editor

REROUTING LEVEL CAP. MCK MIT TONB

- PRT AFR1401
- R1 - Avoid S2
- LC AFR7098
- LC1 - FL380

EDIT APPLY SAVE DELETE RESET DASHBOARD

AFR64M



History Display

R1 avoid S2

Priority	ADEP	ADES
P	EBBR	LFBO
	EBBR	LFBO
	EBBR	LFBO
	LML	EBBR
	EBBR	LFBO
	LSGG	EHAM
P	EBBR	LFBO
P	EBBR	LFBO
	EBBR	LFBO
	EBBR	LFBO
	EBBR	LFBO
	EBBR	LFBO
P	EBBR	LFBO
	EBBR	LFBO

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Attach new measure Send

