

EUROPEAN AIRPORT MOVEMENT MANAGEMENT BY A-SMGCS, Part 2

EMMA2 Results: Prague Ruzyne Ground & On-board Trials

Demonstration Day
Malpensa, 2009-02-26



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Internet: <http://www.dlr.de/emma2>



Integrated Project of the
Sixth Framework Programme,
Priority 1.4:
Aeronautics and Space,
sponsored by EC, DG TREN
Contract FP6-513522



Before EMMA2



EMM

Surveillance

Monitoring & Alerting



Higher A-SMGCS Services in EMMA2



DLR Test Aircraft ATTAS



Generic and Experimental
Cockpit Simulator, BWE

TAXI-CPDLC

EMM

GTD (TIS-B)

Surveillance

Monitoring & Alerting



Apron & Tower Simulator, BWE



Tower Test Bed, PRG

EFS

DMAN

Routing

EFS

Park Air Systems

ON

24	DADAM	S17	LKVO	NOVEMBR	3362
A	XFER		VF14/M	12:00	
24	NAX1505	19	ENGM	DEKOV1A	12:19
A	XFER		B733/M	12:55	
24	RYR1ZC	31	EGBB	DONAD2A	12:17
A	XFER		B738/M	12:40	



Park Air Systems

Airtel

TAXI-CPDLC



DMAN



DLR



Routing

Park Air Systems

CLR_STARTUP

EDIT

FPL-

CPDLC Msg: DADAM

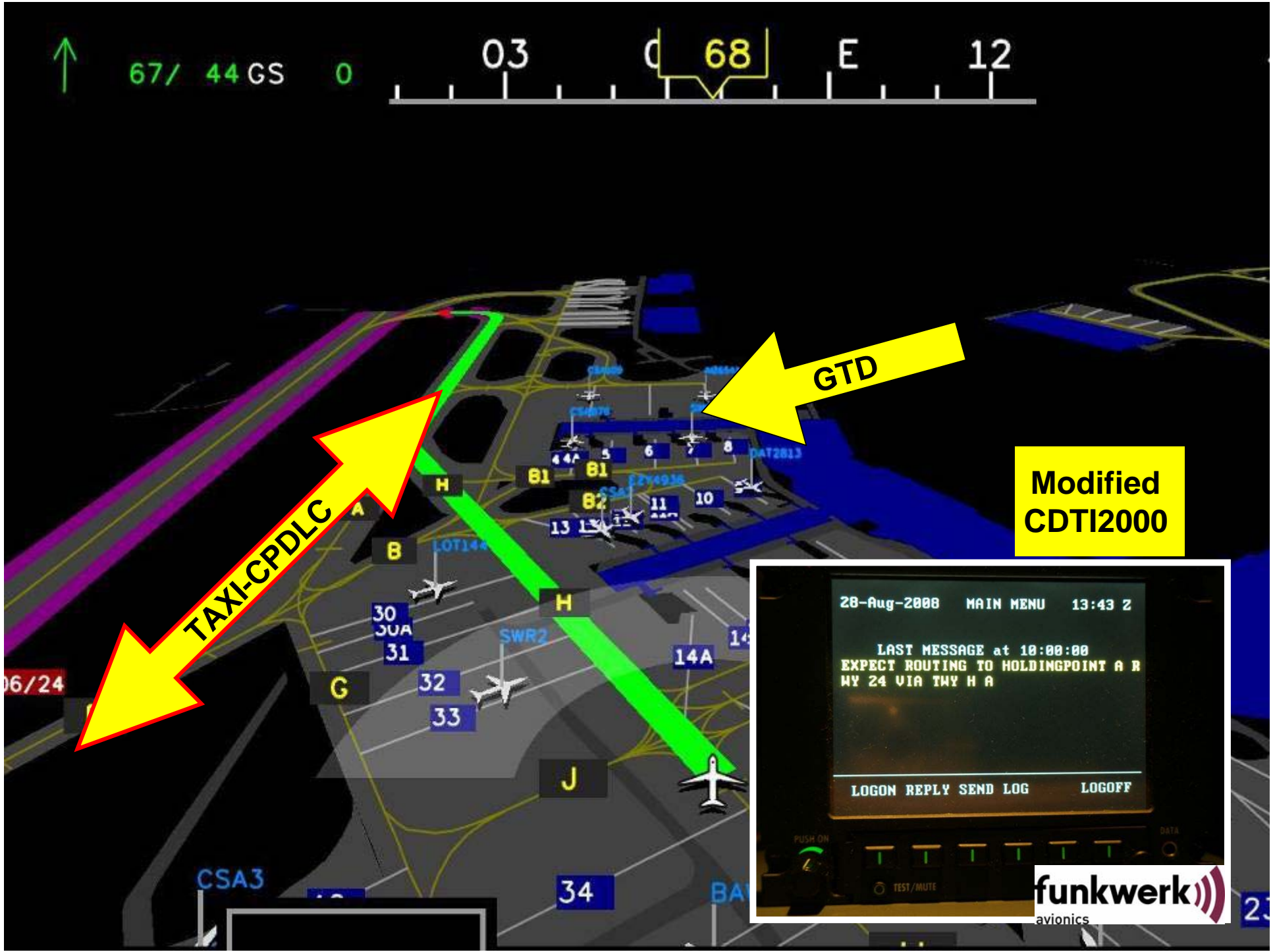
13:57:53 DM25: REQUEST START-UP CLEARANCE
12:22:12 UM239: START-UP APPROVED

↑ 67/ 44 GS 0 03 68 E 12

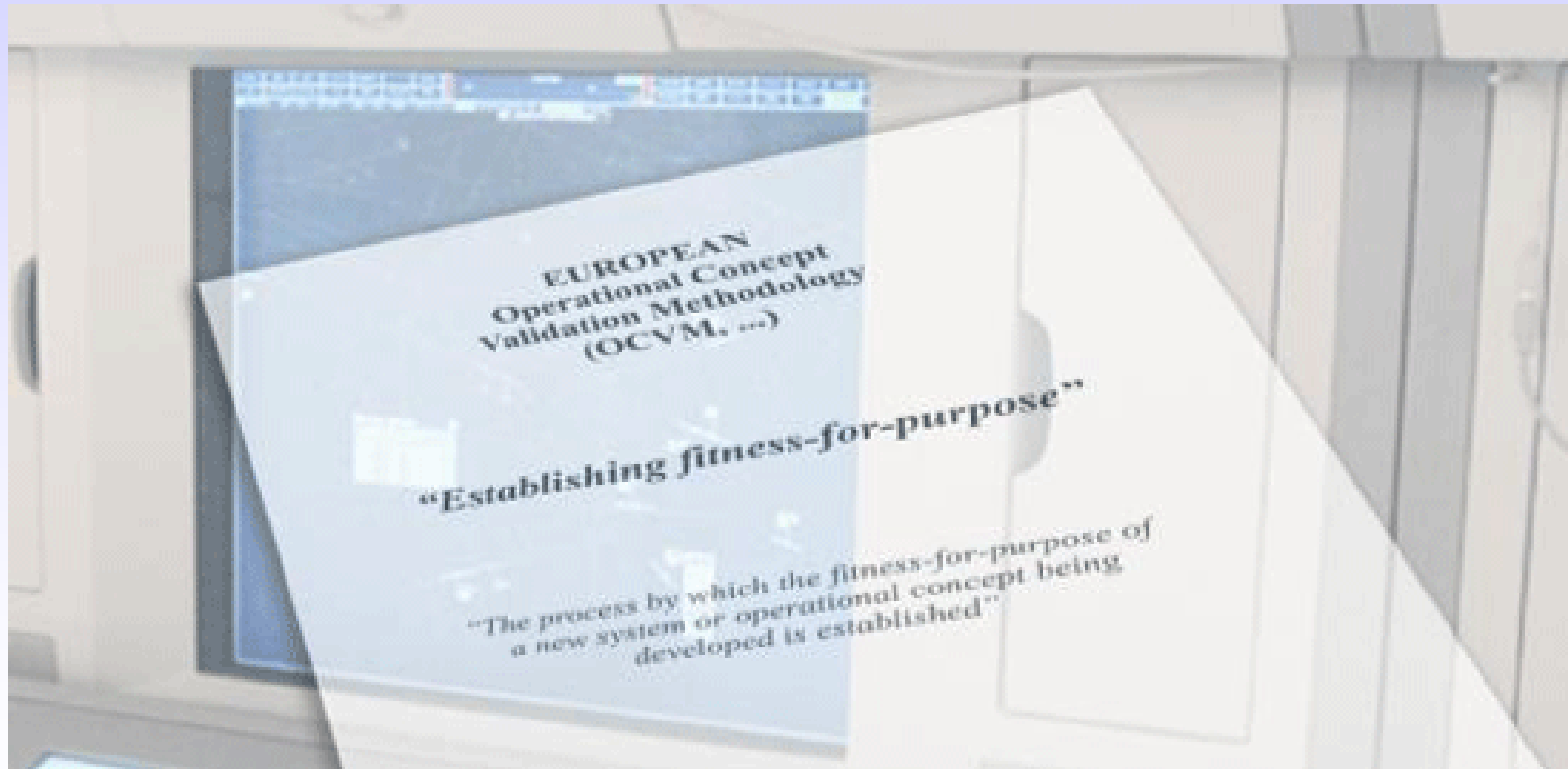
TAXI-CPDLC

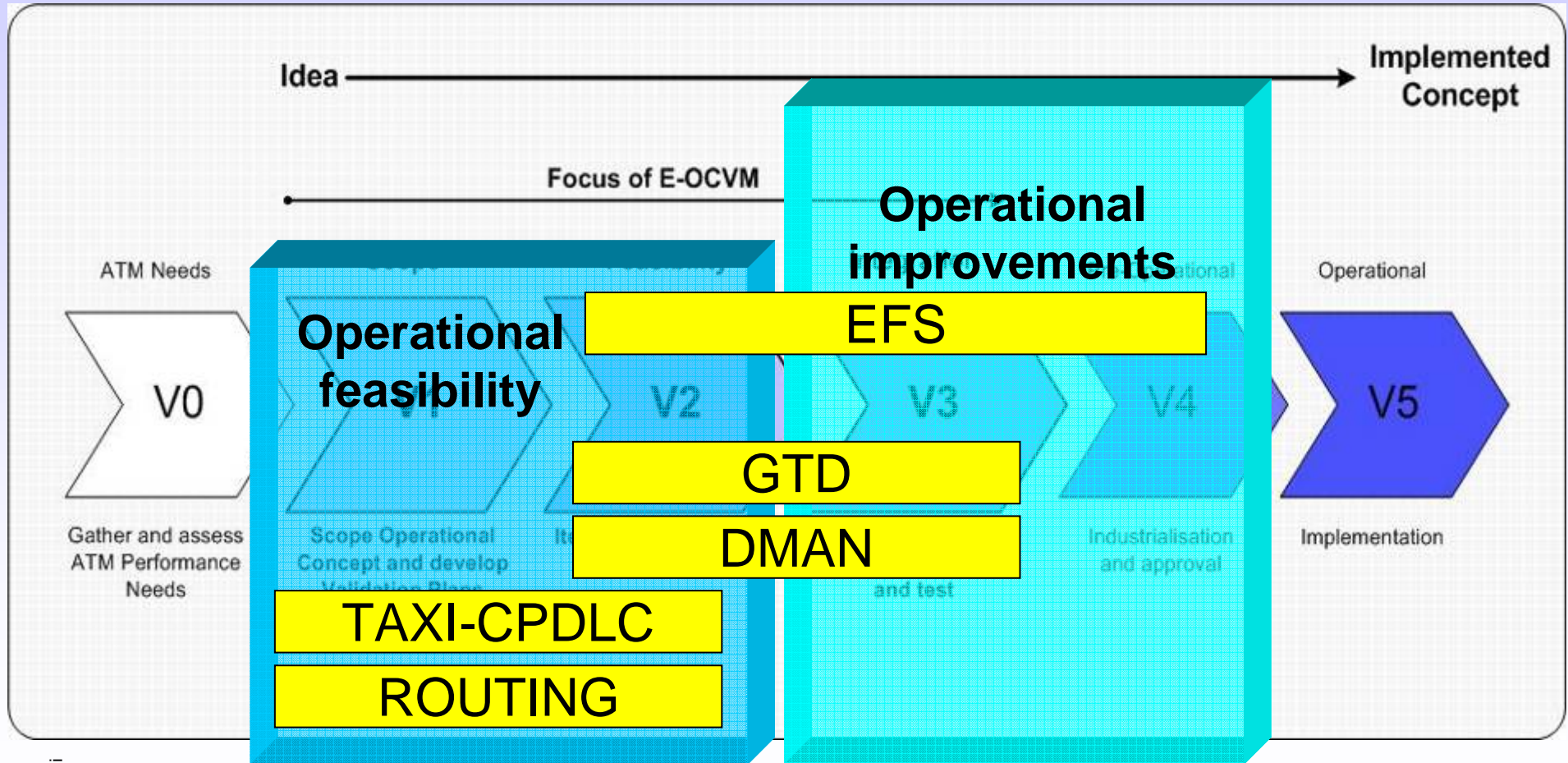
GTD

Modified CDTI2000

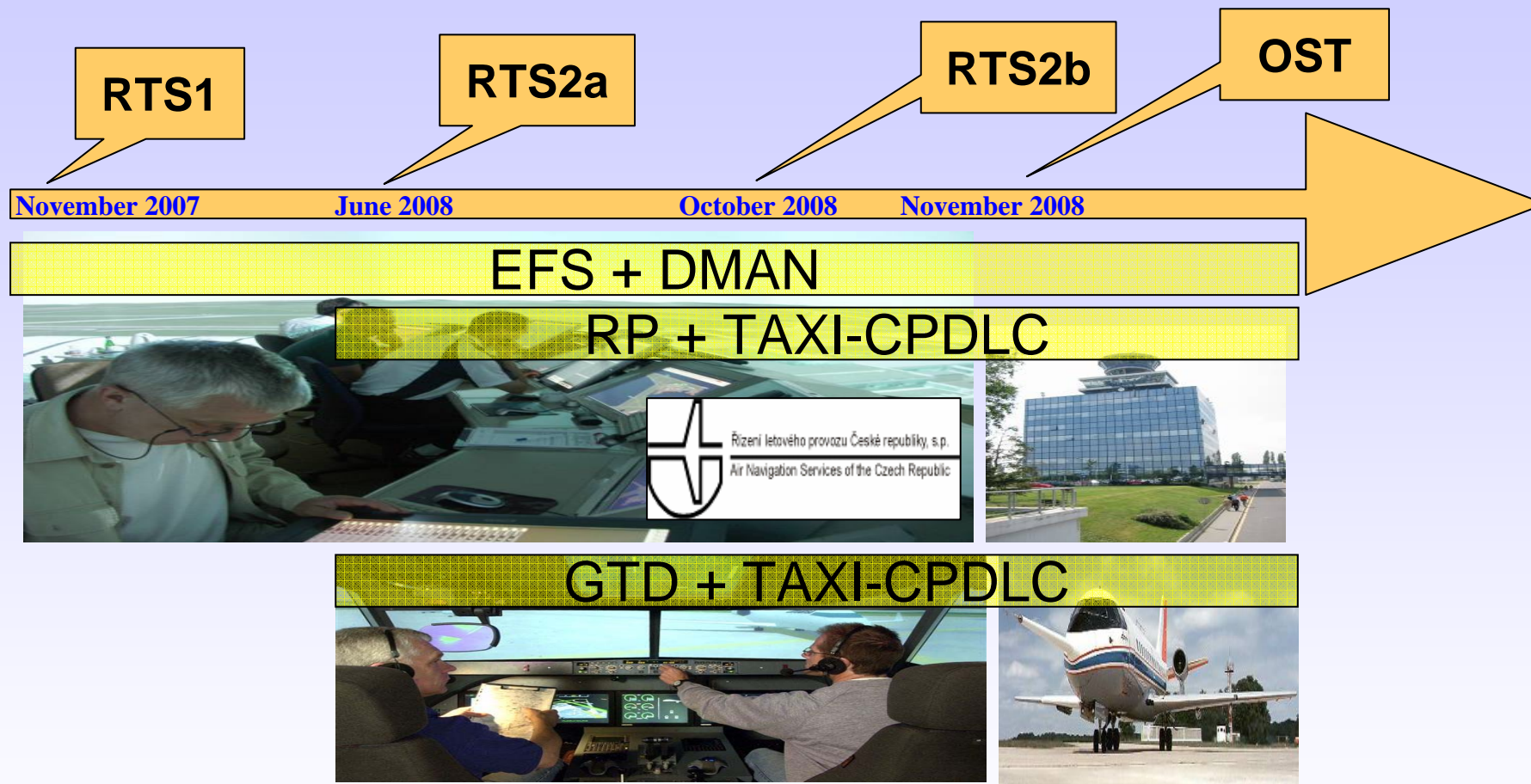


- **E**uropean **O**perational **C**oncept **V**alidation **M**ethodology

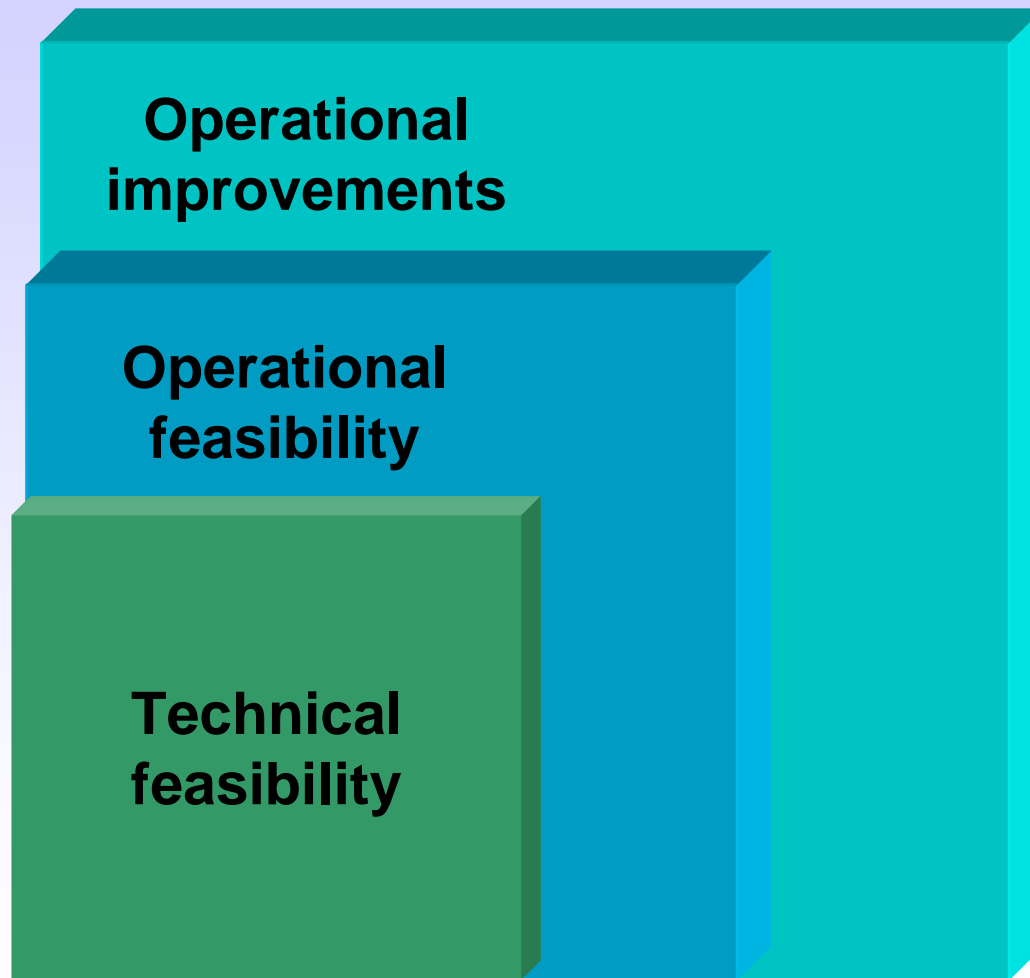




PRG Validation Trials



More than 40 test runs with 55 movements (duration: 60 minutes)
Subjects: 7 ATCOs and 11 airline pilots in RTS and OST



... esp. in PRG on-site trials

ATC
MSG

28-Aug-2008 MAIN MENU 13:43 Z

Sent by A-SMGCS

LAST MESSAGE at 10:00:00
EXPECT ROUTING TO HOLDINGPOINT A R
WY 24 VIA TWY H A

LOGON REPLY SEND LOG LOGOFF

PUSH ON



TEST/MUTE

DATABASE

DATA



28-Aug-2008

REPLY

13:44 Z

BTISCO

UNABLE

STANDBY

ROGER

UNABLE DUE TO

AFFIRM

NEGATIVE

BACK

^

v

SEL

28-Aug-2008

REPLY SEND

13:44 Z

reply to

ATLCO

BACK

^

v

SEL

28-Aug-2008 MAIN MENU 13:44 2

LAST MESSAGE at 13:44:43

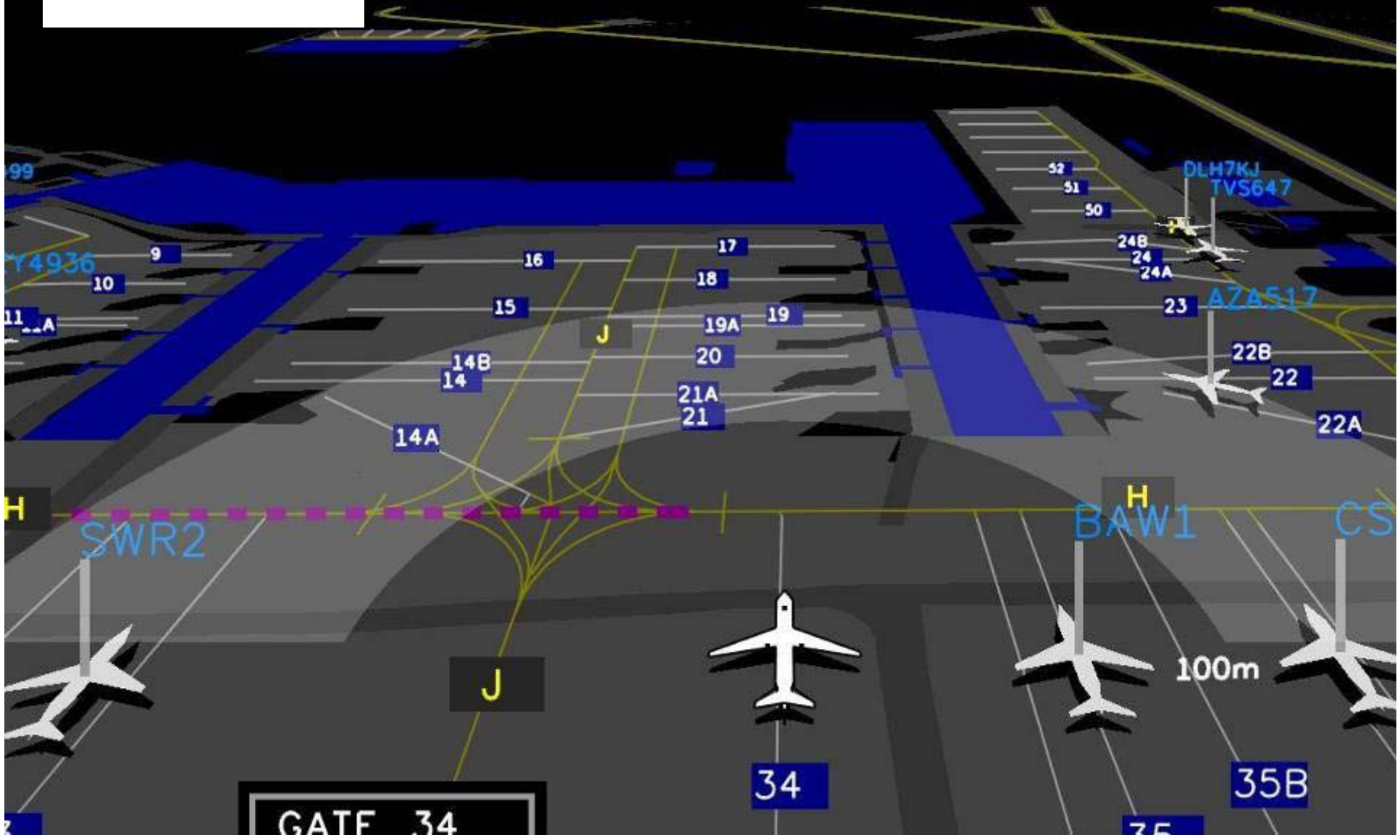
WILCO

LOGON REPLY SEND LOG LOGOFF

↑ 124/ 44 GS 0

E 125 15 S

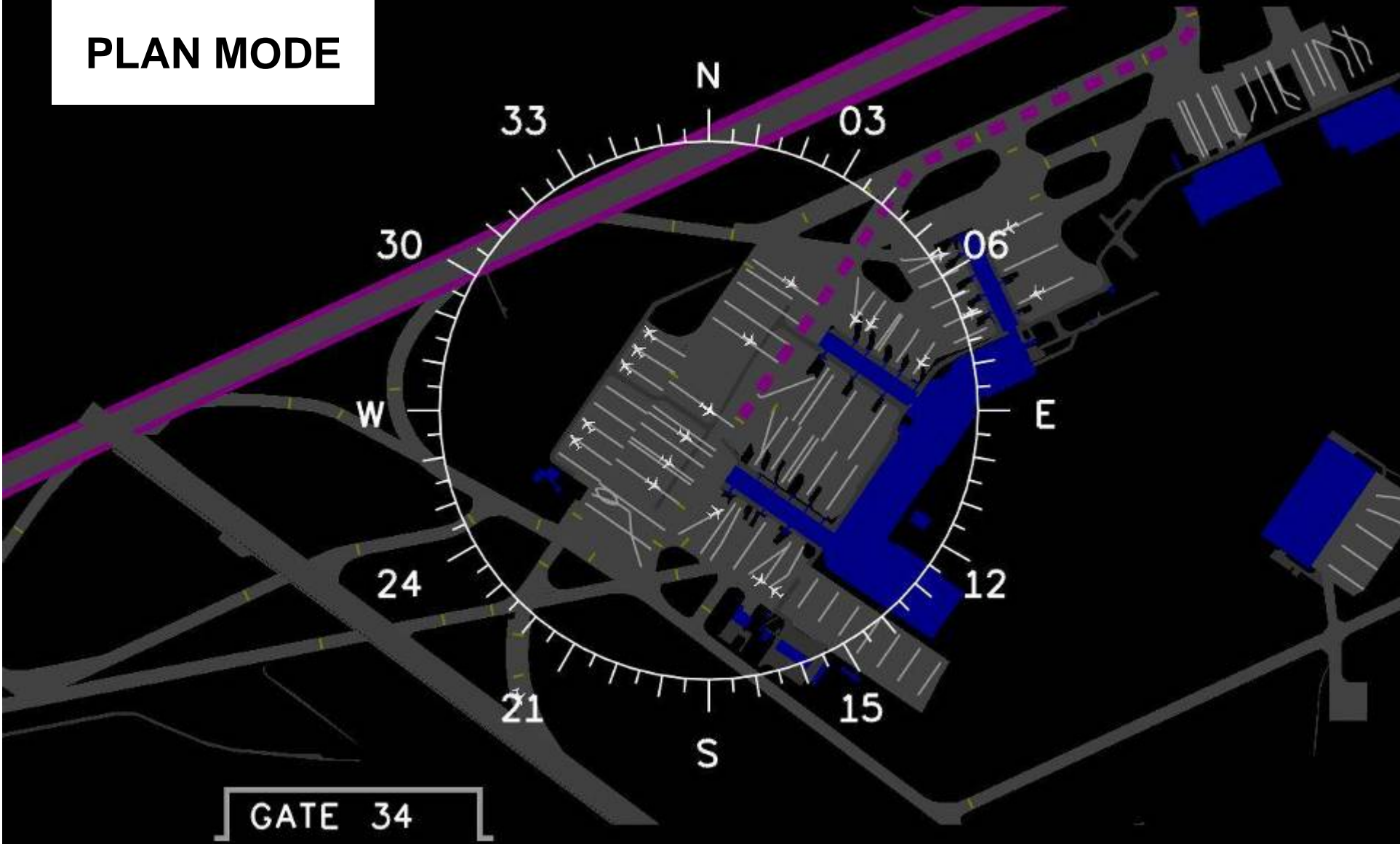
NAV MODE



↑ 124 / 44 GS 0



PLAN MODE



28-Aug-2008 SEND MSG 13:45 Z

AIRCO

UNABLE

STANDBY

ROGER



REQUEST {clearanceType} CLEARANCE

ERROR {errorInformation}

NOT CURRENT DATA AUTHORITY

CURRENT DATA AUTHORITY {facility}

REQUEST END OF SERVICE

NOT AUTHORIZED NEXT DATA AUTHORIT

MORE

BACK

^

v

SEL

EuroTelematik

28-Aug-2008 SEND MSG 13:45 Z

{to report location}

REVERTING TO VOICE

REQUEST FOR START-UP {timeInforma

REQUEST PUSHBACK {timeInformation

REQUEST TAXI ROUTING INFORMATION

ON-BLOCKED

MORE

BACK

^

v

SEL

select

PUSH ON

DATA

28-Aug-2008 MAIN MENU 13:46 Z

LAST MESSAGE at 13:46:36
REQUEST start-up CLEARANCE

LOGON REPLY SEND LOG LOGOFF

↑ HA 12:19 ←
24 NAX1505 19 ENGM DEKOV1A
A XFER B733/M 12:55

↑ HZA 12:17 ←
24 RYR1ZC 31 EGBB DONAD2A
A XFER B738/M 12:40 6633

EDIT

FPL - 1

CPDLC Msg: DADAM
13:57:53 DM25: REQUEST START-UP CLEARANCE

Recording window



ON Vodochody
24 DADAM S17 LKVO NOVEMBR 3362
A AIC SUP VF14/M 12:00 FPL

↑	ON		PLHA		12:22	←
↑	24	DADAM	S17	LKVO	NOVEMBR	3362
	A	XFER		VF14/M	12:00	
↑	24	NAX1505	19	ENGM	DEKOV1A	
	A	XFER		B733/M	12:55	
↑	24	RYR1ZC	31	EGBB	DONAD2A	6633
	A	XFER		B738/M	12:40	

CLR_STARTUP

EDIT

FPL-

CPDLC Msg: DADAM
 13:57:53 DM25: REQUEST START-UP CLEARANCE
 12:22:12 UM239: START-UP APPROVED

STATUS
 POWER



W
 PRET
 A PC
 A

28-Aug-2008 MAIN MENU 13:50 Z

LAST MESSAGE at 13:41:22
START_UP APPROVED

ATC

LOGON REPLY SEND LOG LOGOFF

28-Aug-2008 MAIN MENU 13:44 2

LAST MESSAGE at 13:44:43

WILCO

LOGON REPLY SEND LOG LOGOFF

28-Aug-2008

MAIN MENU

13:51 Z

LAST MESSAGE at 13:51:47
REQUEST taxi CLEARANCE



LOGON REPLY SEND LOG

LOGOFF

↑ ON PLHA 3 -4 12:41 ←
24 DADAM S17 LKVO NOVEMBR 3362
A TAXI VF14/M 12:00

↑ HA 4 12 12:50 ←
24 NAX1505 19 ENGM DEKOV1A
A PUSH B733/M 12:55

↑ HZA 2 1 12:37 ←
24 RYR1ZC 31 EGGB DONAD2A 6633
A TAXI B738/M 12:40

CLR_TAXI

DEP ACTIVE PUSH

CPDLC Msg: DADAM

13:57:53 DM25: REQUEST START-UP CLEARANCE
12:22:12 UM239: START-UP APPROVED
13:59:07 DM0: WILCO
12:22:27 UM117: CONTACT LKPR GROUND 121.900
13:59:52 DM0: WILCO
14:08:07 DM25: REQUEST TAXI CLEARANCE

AutoTelomark

28-Aug-2008 MAIN MENU 13:53 Z

LAST MESSAGE at 18:00:00
TAXI TO HOLDINGPOINT A RWY 24 VIA
TWY H A

ATC

LOGON REPLY SEND LOG LOGOFF

28-Aug-2008 MAIN MENU 13:53 Z

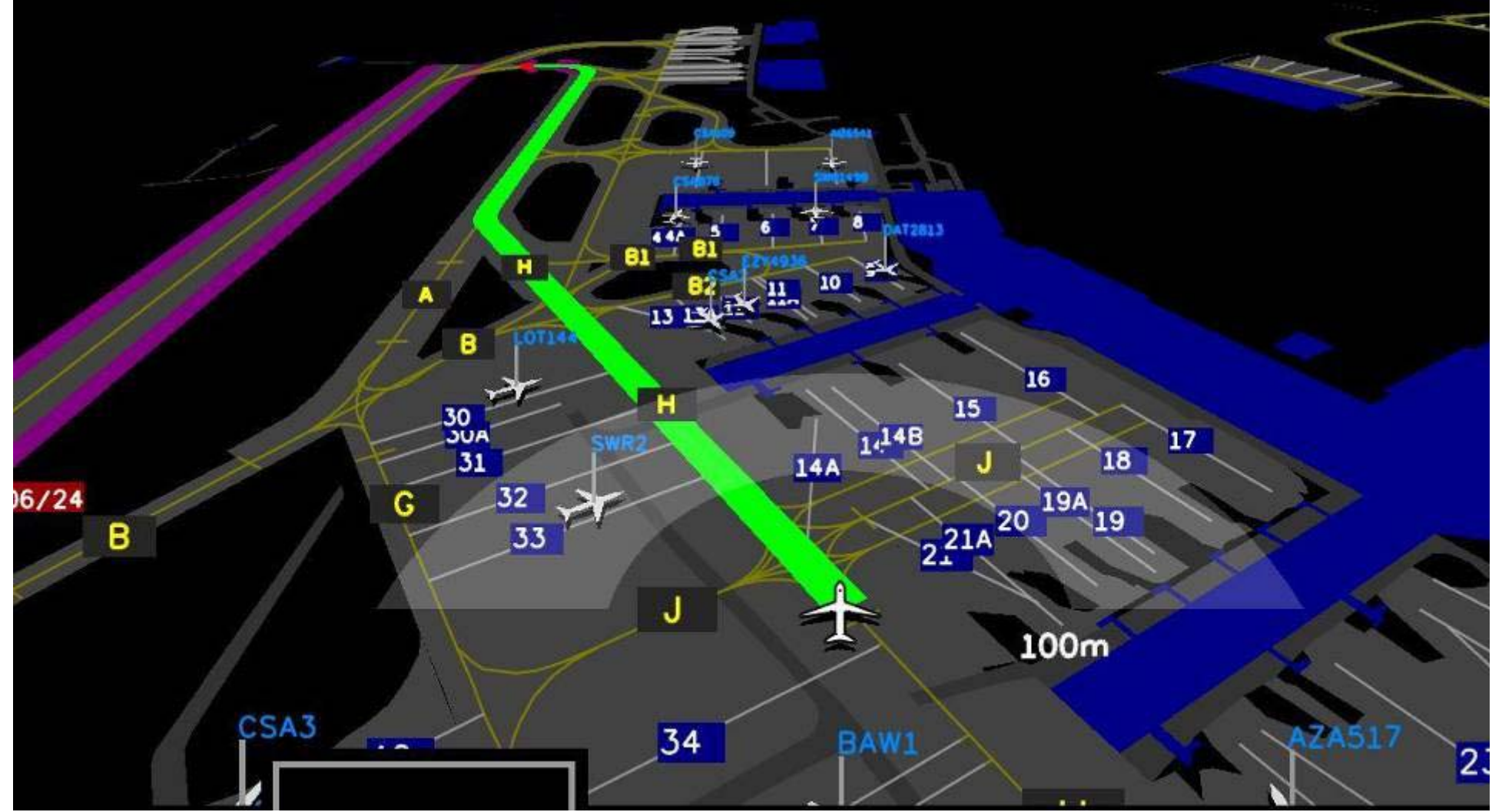
LAST MESSAGE at 13:53:20
WILCO



LOGON REPLY SEND LOG LOGOFF



67/ 44 GS 0



204 op. Requ.
from
EMMA2
Concept

Operational feasibility

ATCO Questionnaire

ID	General	EMMA2 OR
	The A-SMGCS is able to integrate new movements and thus provides complete situational information.	① ② ③ ④ ⑤ ⑥ GEN_Serv-04
	When working with the A-SMGCS responsibilities and functions do vary but are clearly defined.	① ② ③ ④ ⑤ ⑥ GEN_Serv-06
	I think the A-SMGCS was well integrated into the existing systems.	① ② ③ ④ ⑤ ⑥ GEN_Serv-10

Pilot Questionnaire

ID	General	EMMA2 OR
	The A-SMGCS is able to integrate new movements and thus provides complete situational information.	① ② ③ ④ ⑤ ⑥ GEN_Serv-04
	When working with the A-SMGCS responsibilities and functions do vary but are clearly defined.	① ② ③ ④ ⑤ ⑥ GEN_Serv-06
	I think the A-SMGCS was well integrated into the existing systems.	① ② ③ ④ ⑤ ⑥ GEN_Serv-10

Technically Checked

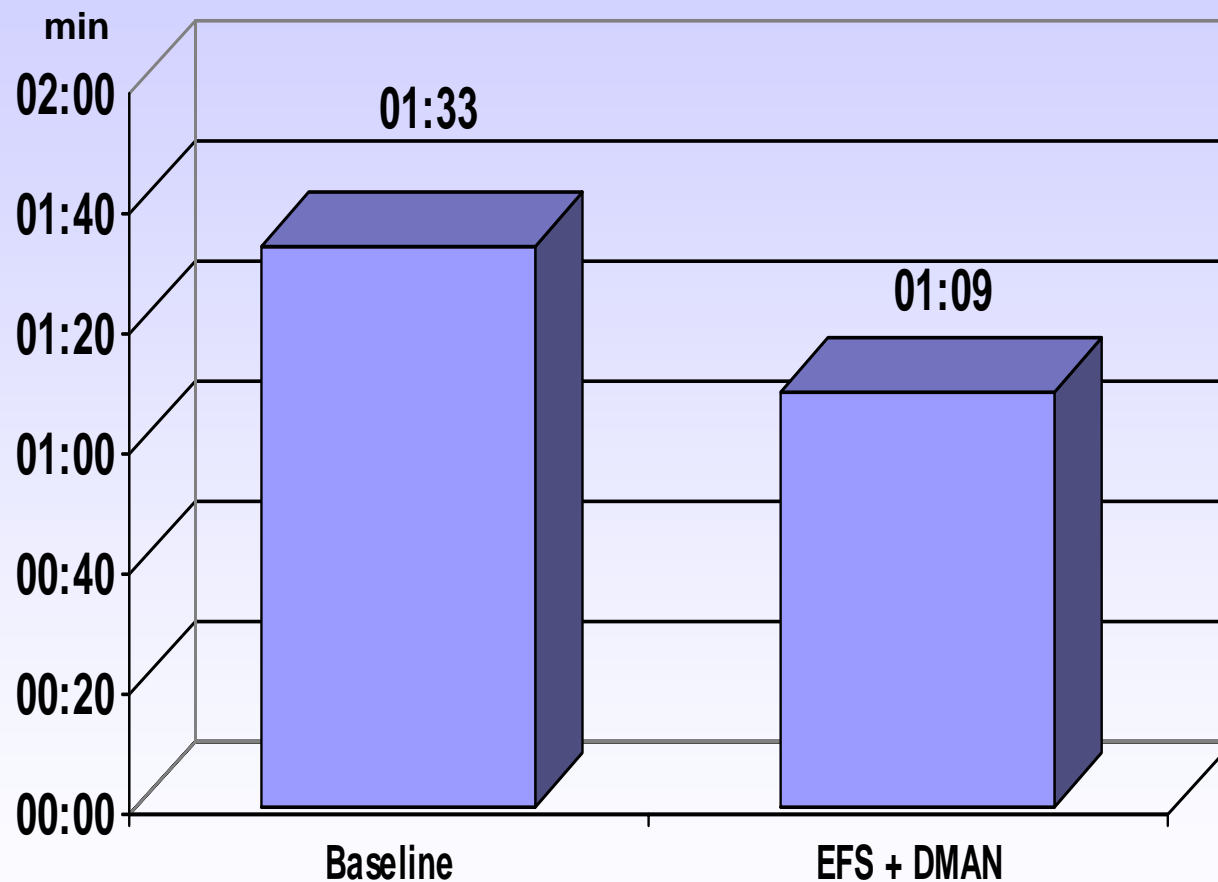
ID	General	EMMA2 OR
	The A-SMGCS is able to integrate new movements and thus provides complete situational information.	① ② ③ ④ ⑤ ⑥ GEN_Serv-04
	When working with the A-SMGCS responsibilities and functions do vary but are clearly defined.	① ② ③ ④ ⑤ ⑥ GEN_Serv-06
	I think the A-SMGCS was well integrated into the existing systems.	① ② ③ ④ ⑤ ⑥ GEN_Serv-10

EMMA2 Checklist with feedback to 204 op. Requ.

Operational Requirement	Mean of OE-OF item ("marks significant")	Verified	Partly Verified	Not Verified	Others	Comments
GEN_Serv-01 An A-SMGCS should support the following primary						
GEN_Serv-02 Planning Function						MA2 in verified of A
GEN_Serv-03 Visibility Conditions						
GEN_Serv-04 Provision Information						solution used by EMMA2 in Prague.

Stop Time during Taxiing

Oper. improvements

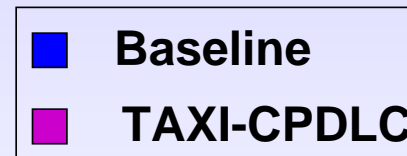
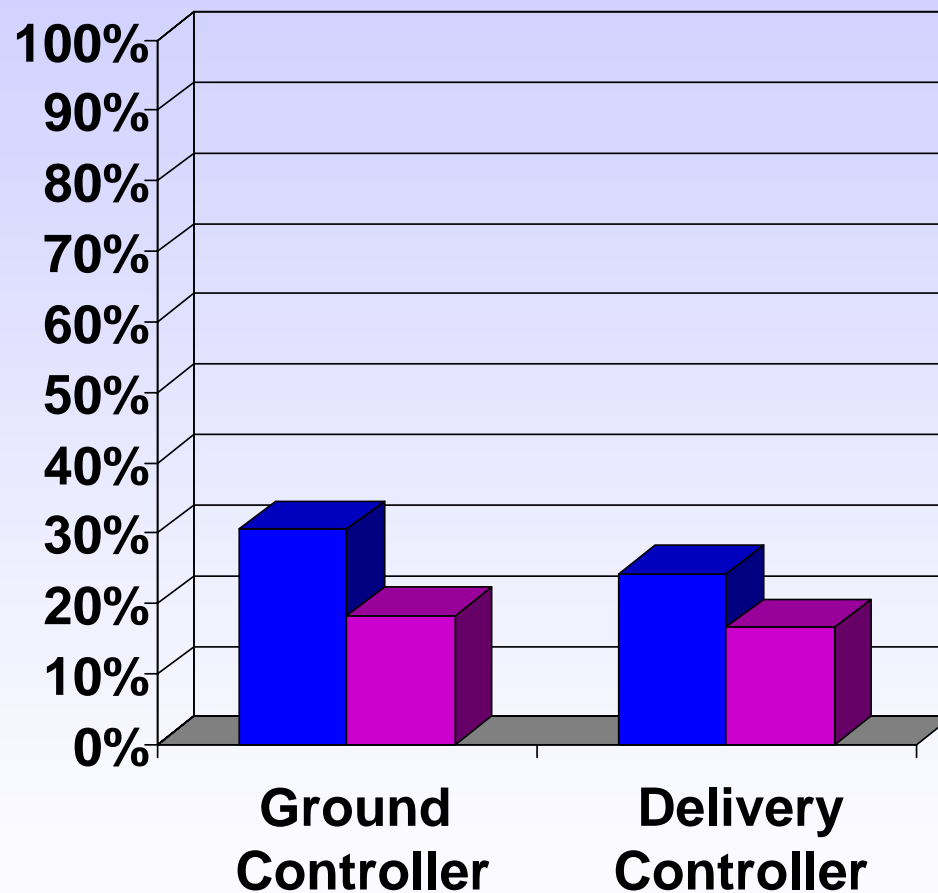


$p = .046^*$

R/T Communication load

Operational improvements

test run time



50% aircraft equipped

↑	ON		PLHA		12:22	←
↑	24	DADAM	S17	LKVO	NOVEMBR	3362
	A	XFER		VF14/M	12:00	
↑	24	NAX1505	19	ENGM	DEKOV1A	
	A	XFER		B733/M	12:55	
↑	24	RYR1ZC	31	EGBB	DONAD2A	6633
	A	XFER		B738/M	12:40	

CLR_STARTUP

EDIT

FPL-

CPDLC Msg: DADAM
 13:57:53 DM25: REQUEST START-UP CLEARANCE
 12:22:12 UM239: START-UP APPROVED

STATUS
 POWER



W
 PRET
 A PC
 A

Further important Outcomes

- improved situational awareness of ATCOs, Pilots & vehicles driver
- anticipated constraints mostly rejected
- important feedback to new procedures dealing with DMAN and TAXI-CPDLC
- new services proved their techn. & oper. feasibility

24

S17

NOVEMBER

12:00

A XFER

A XFER

B733/M

12:55

HZA

A XFER

B738/M

12:40

EDIT

FPL

CPDLC Msg: DADAN

11:52:53 DM25 REQUEST START UP CLEARANCE

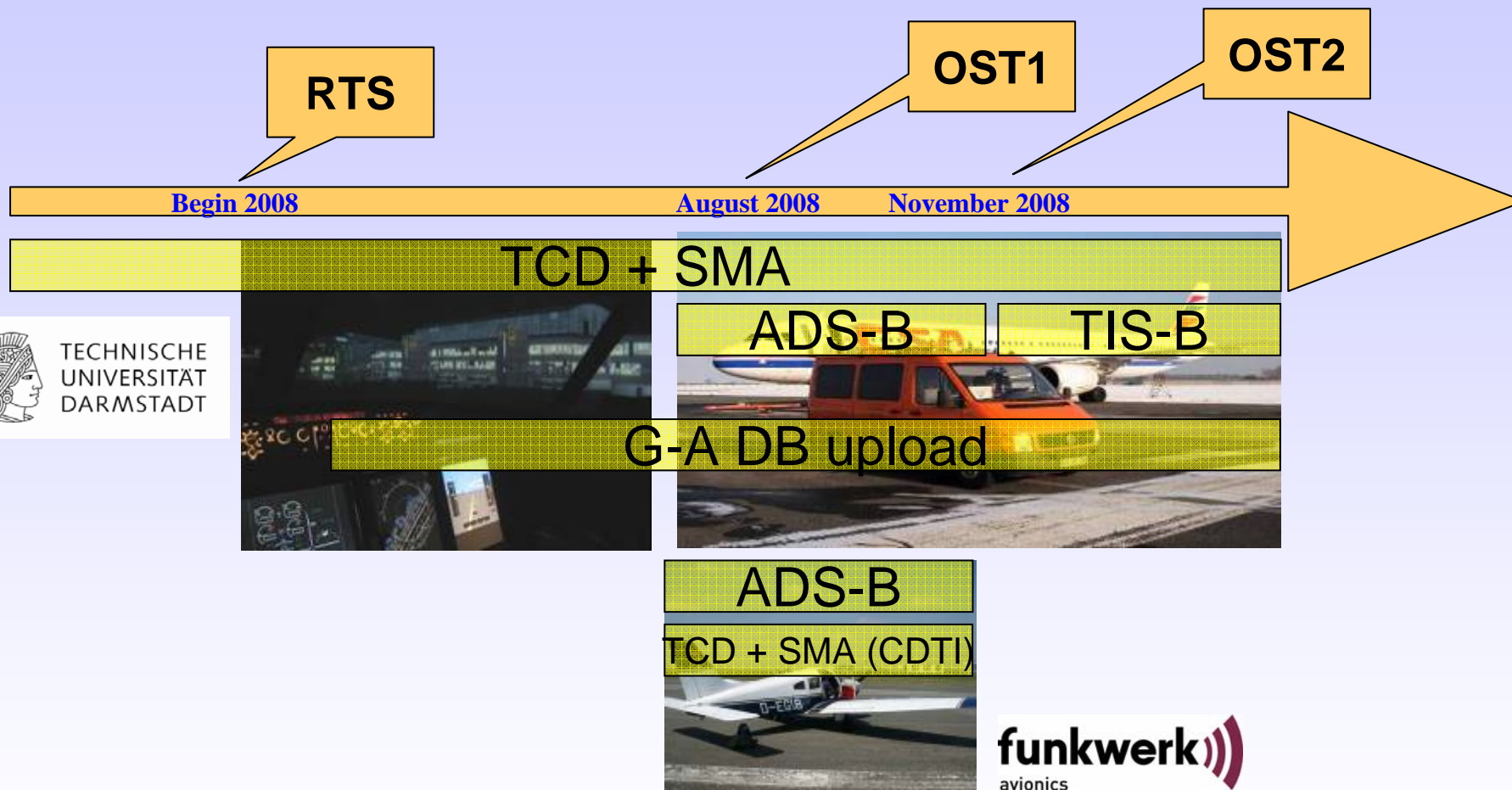
12:22:12 DM230 START UP APPROVED

Next Steps

- **fine-tuning** of DMAN to Airport peculiarities
- integrate DMAN into a **CDM** environment
- further **investigate promising new procedures**, e.g.
 - TAXI-CPDLC for revised taxi or crossing clearances
 - onboard GTD in VIS3/4 conditions
- further **improve HMIs** dealing with TAXI-CPDLC (onboard & ground)
- further **improve the routing function** to cope with all potential taxi routes

11:52:51 DM25 REQUEST START UP CLEARANCE
12:22:12 DM230 START UP APPROVED

Additional PRG Validation Trials



Subjects: altogether 9 pilots