EMMA2 Results:
Prague Ruzyne
Ground & On-board Trials

Demonstration Day
Malpensa, 2009-02-26

Jörn Jakobi
Klaus Werner
Marcus Biella
Thomas Ludwig

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

Internet: http://www.dlr.de/emma2
Before EMMA2

Surveillance
Monitoring & Alerting

Apron & Tower Simulator, BWE
Tower Test Bed, PRG

Generic and Experimental Cockpit Simulator, BWE

DLR Test Aircraft ATTAS
Higher A-SMGCS Services in EMMA2

- Generic and Experimental Cockpit Simulator, BWE
- DLR Test Aircraft ATTAS
- Apron & Tower Simulator, BWE
- Tower Test Bed, PRG

Surveillance
Monitoring & Alerting
Routing
EFS
DMAN
GTD (TIS-B)
TAXI-CPDLC
<table>
<thead>
<tr>
<th>Flight Number</th>
<th>Origin</th>
<th>Destination</th>
<th>Time</th>
<th>Speed</th>
</tr>
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<tbody>
<tr>
<td>24 DADAM</td>
<td>PLHA</td>
<td>LKVO</td>
<td>12:22</td>
<td>3362</td>
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<tr>
<td>A XFER</td>
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<tr>
<td>24 NAX1505</td>
<td>HA</td>
<td>ENGM</td>
<td>12:19</td>
<td>6633</td>
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<tr>
<td>24 RYR1ZC</td>
<td>HZA</td>
<td>EGBB</td>
<td>12:17</td>
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<td>A XFER</td>
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Following E-OCVM

• European Operational Concept Validation Methodology
E-OCVM: Levels of maturity

Operational improvements

EFS
GTD
DMAN
TAXI-CPDLC
ROUTING
More than 40 test runs with 55 movements (duration: 60 minutes)
Subjects: 7 ATCOs and 11 airline pilots in RTS and OST
Operational improvements

Operational feasibility

Technical feasibility

... esp. in PRG on-site trials
LAST MESSAGE at 10:00:00
EXPECT ROUTING TO HOLDINGPOINT A R
WY 24 VIA TWY H A
28-Aug-2008 REPLY 13:44 Z

WILCO UNABLE STANDBY ROGER UNABLE DUE TO AFFIRM NEGATIVE
reply to

Hilco
28-Aug-2008 MAIN MENU 13:44 Z

LAST MESSAGE at 13:44:43

WILCO

LOGON  REPLY  SEND  LOG  LOGOFF
28-Aug-2008 SEND MSG 13:45 Z

UNABLE
STANDBY
ROGER
REQUEST {clearanceType} CLEARANCE
ERROR {errorInformation}
NOT CURRENT DATA AUTHORITY
CURRENT DATA AUTHORITY {facility}
REQUEST END OF SERVICE
NOT AUTHORIZED NEXT DATA AUTHORITY
28-Aug-2008  SEND MSG  13:45 Z

REVERTING TO VOICE
REQUEST FOR START-UP {timeInformation}
REQUEST PUSHBACK {timeInformation}
REQUEST TAXI ROUTING INFORMATION ON-BLOCKED
LAST MESSAGE at 13:46:36
REQUEST start-up CLEARANCE
28-Aug-2008   MAIN MENU   13:50 Z

LAST MESSAGE at 13:41:22
START_UP APPROVED

LOGON   REPLY   SEND   LOG   LOGOFF
28-Aug-2008   MAIN MENU   13:44 Z

LAST MESSAGE at 13:44:43
WILCO

LOGON  REPLY  SEND  LOG  LOGOFF
LAST MESSAGE at 13:51:47
REQUEST taxi CLEARANCE
28-Aug-2008  MAIN MENU  13:53 Z

LAST MESSAGE at 10:00:00
TAXI TO HOLDINGPOINT A RWY 24 VIA TWY H A
28-Aug-2008 MAIN MENU 13:53 Z

LAST MESSAGE at 13:53:20
WILCO

LOGON REPLY SEND LOG LOGOFF
204 op. Requ. from EMMA2 Concept

EMMA2 Checklist with feedback to 204 op. Requ.
Stop Time during Taxiing

Oper. improvements

Baseline: 1:33
EFS + DMAN: 1:09

p = .046*

p = .046*
Operational improvements

R/T Communication load

Test run time

Baseline
TAXI-CPDLC

50% aircraft equipped
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
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
Additional PRG Validation Trials

Subjects: altogether 9 pilots