TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Transportation and Traffic Sciences - Chair of Air Transport Technology and Logistics

Real-time Wind Uplinks for Predication of the Arrival Time and Optimization of the Descent Profile

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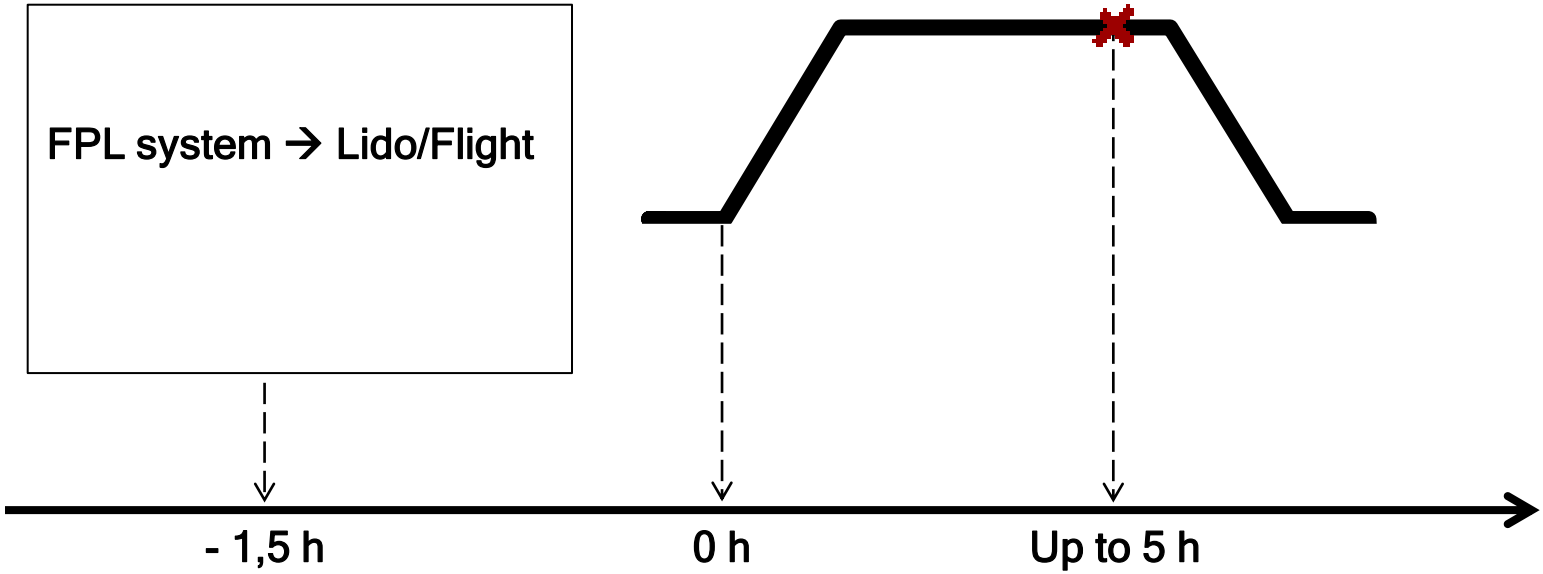
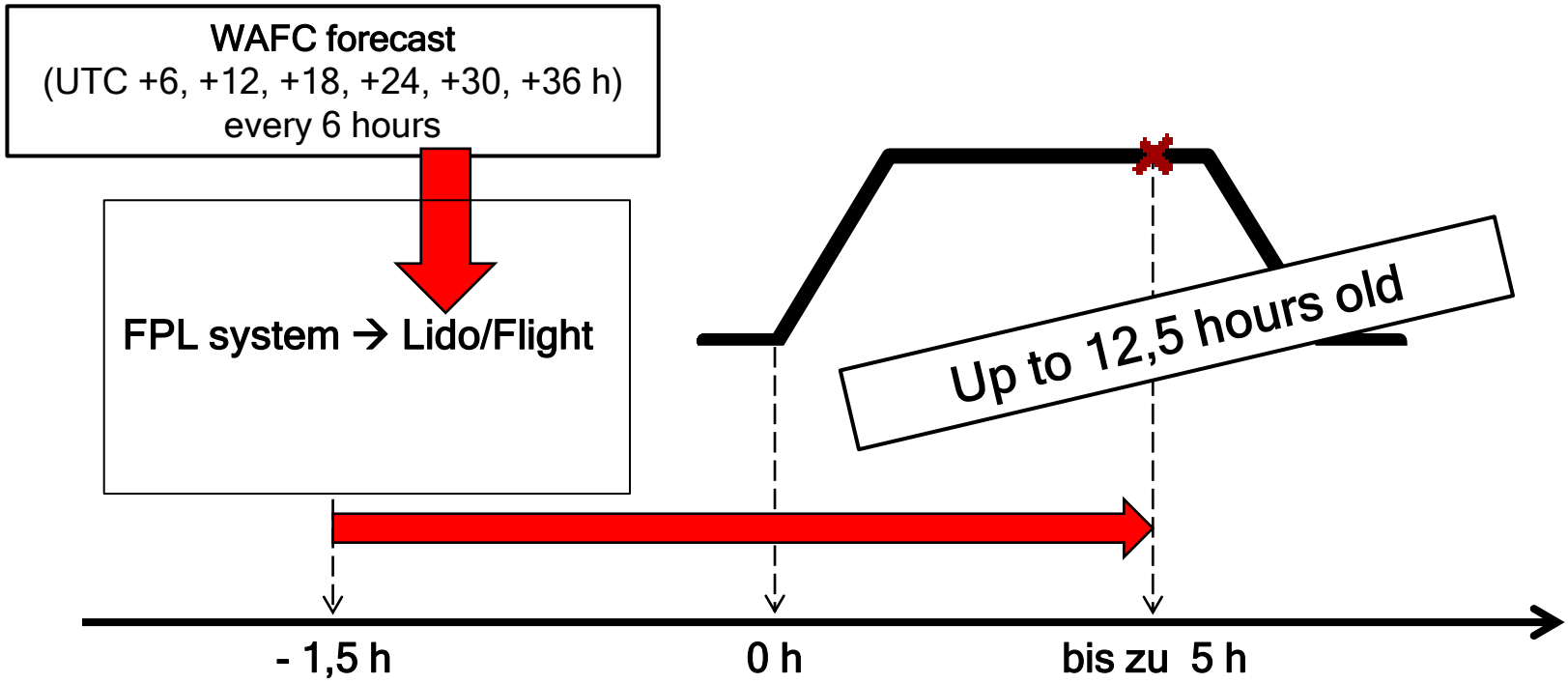
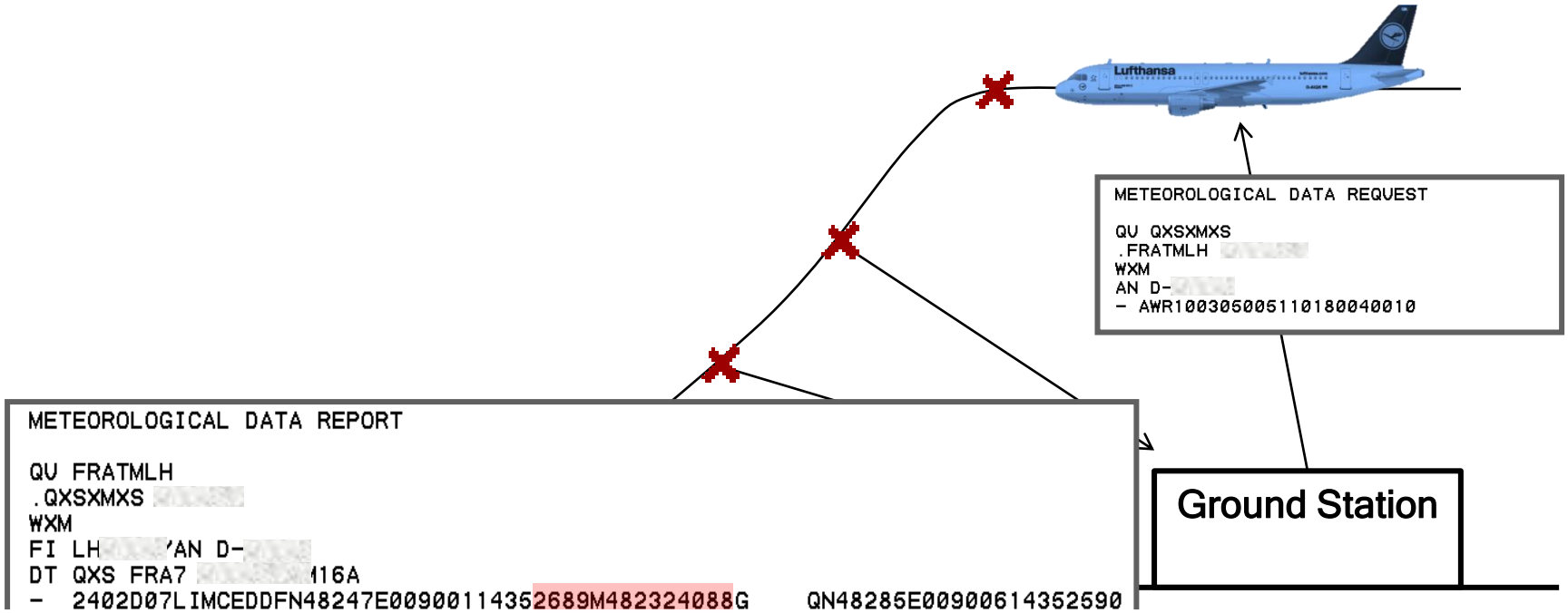
Outline

Wind information at short and middle range flights

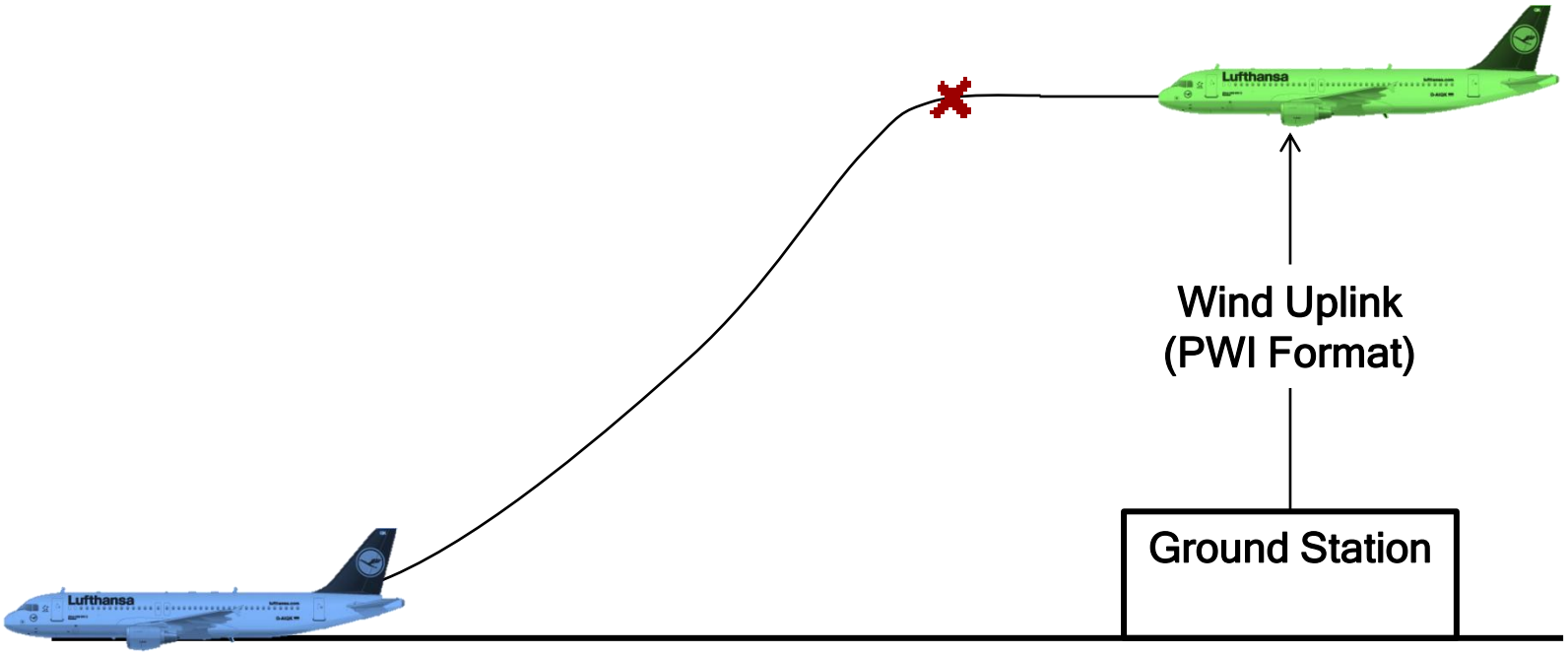


Wind information on short and middle range flights





→ Aircraft Meteorological Data Relay (AMDAR)



→ Predicted Wind Information (PWI) – automated wind uplink for long range flights

Conditions

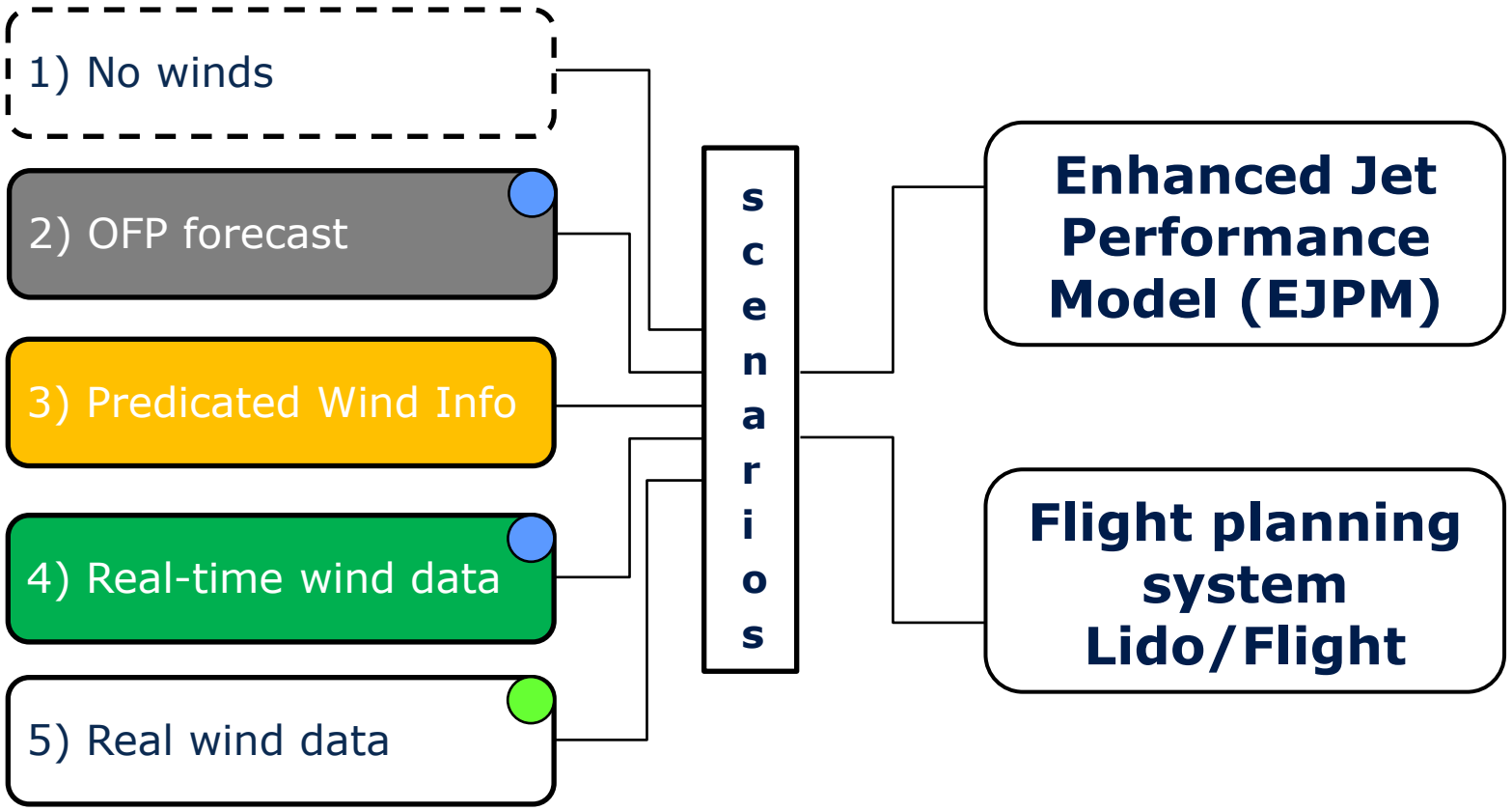
- airport → Frankfurt/Main (Germany)
- aircraft type → A320 fleet (short and mid range flights)
- 6 test pilots

Testing

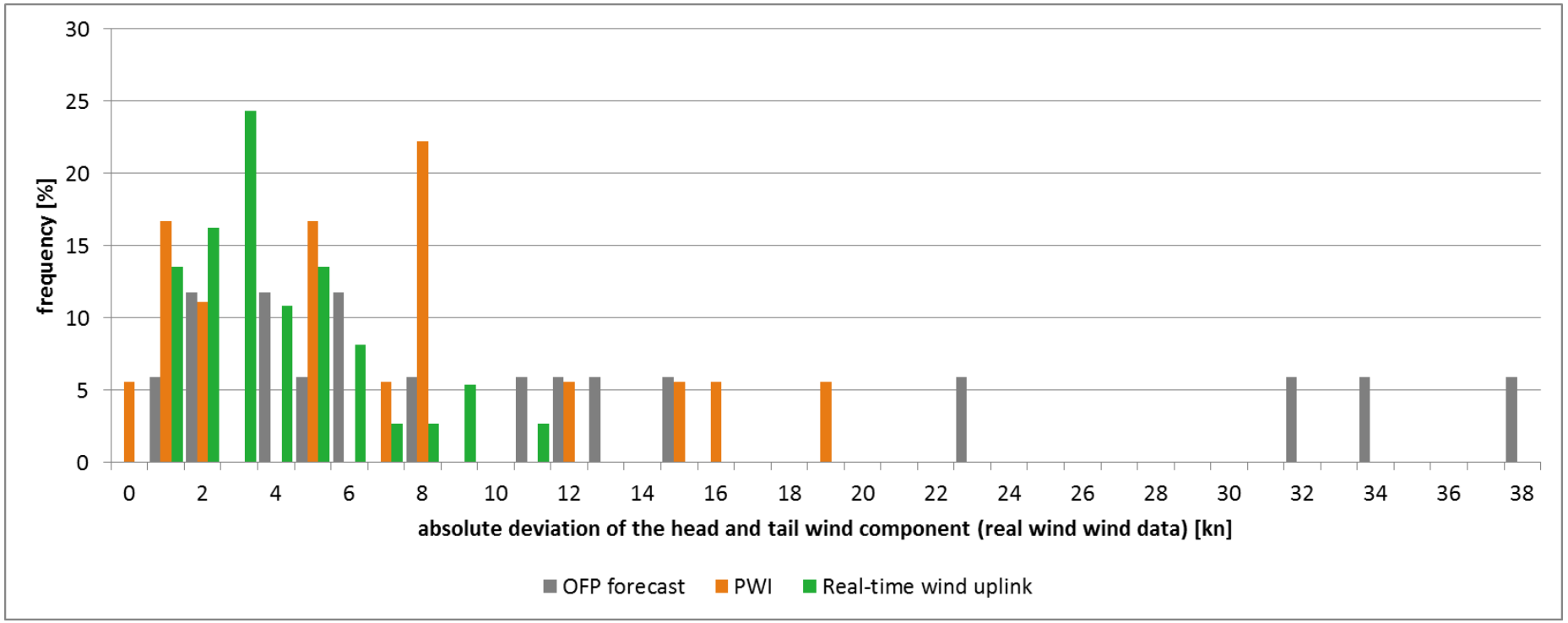
- working schedule of test pilots
- similar arrival direction for prior a/c → wind fields, jet streams
- briefing, test protocol, debriefing

→ output different wind forcast data for this arrival route

3 Theoretical Analysis



3 Theoretical Analysis



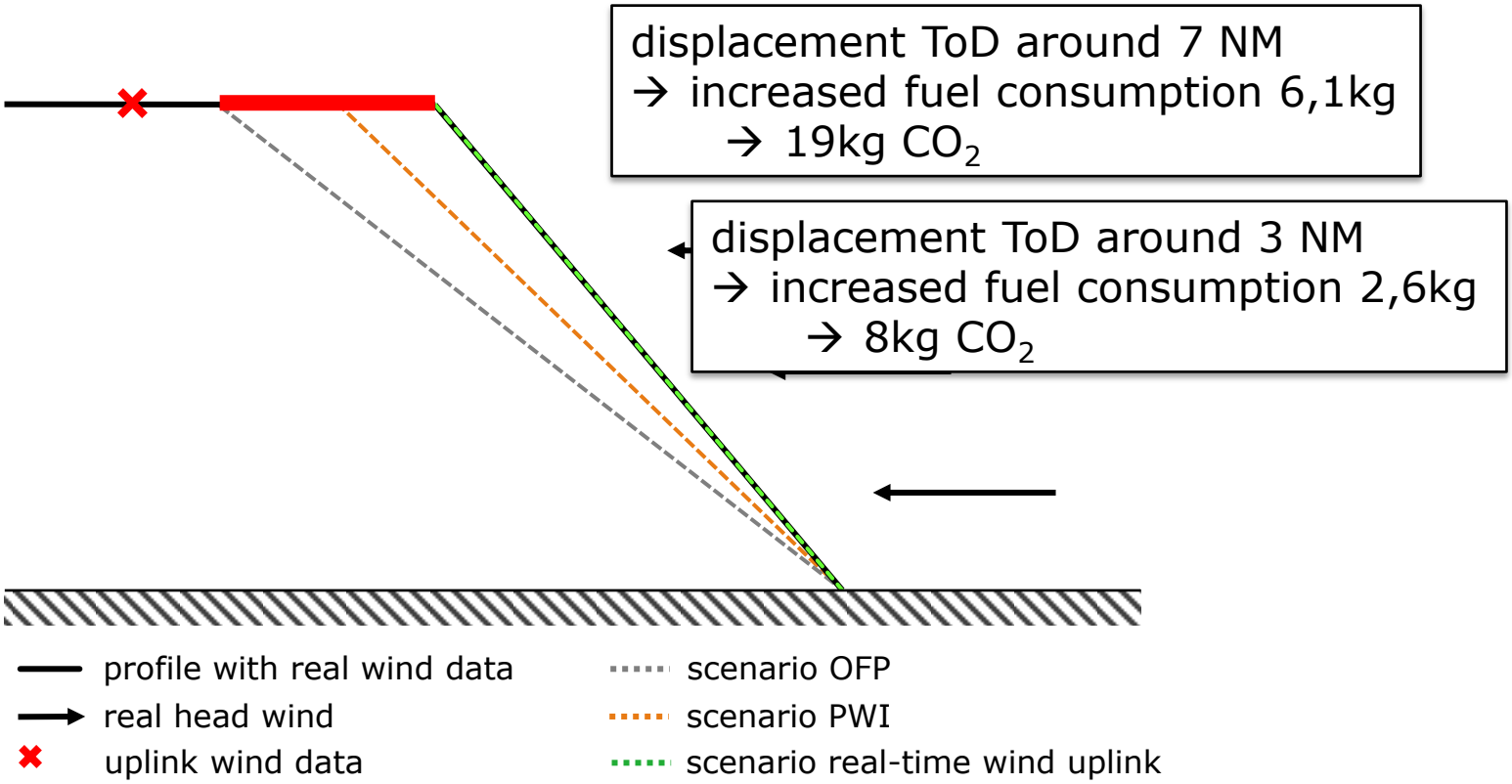
a) EJPM calculation (example MXP-FRA)

- high precision fuel calculation and time prediction based on measured flight data (database OFP and measured a/c-positions)

scenario	time [min]
OPF forecast	50:47
PWI uplink	**51:37**
Real-time wind uplink	52:37
Real wind data	51:51

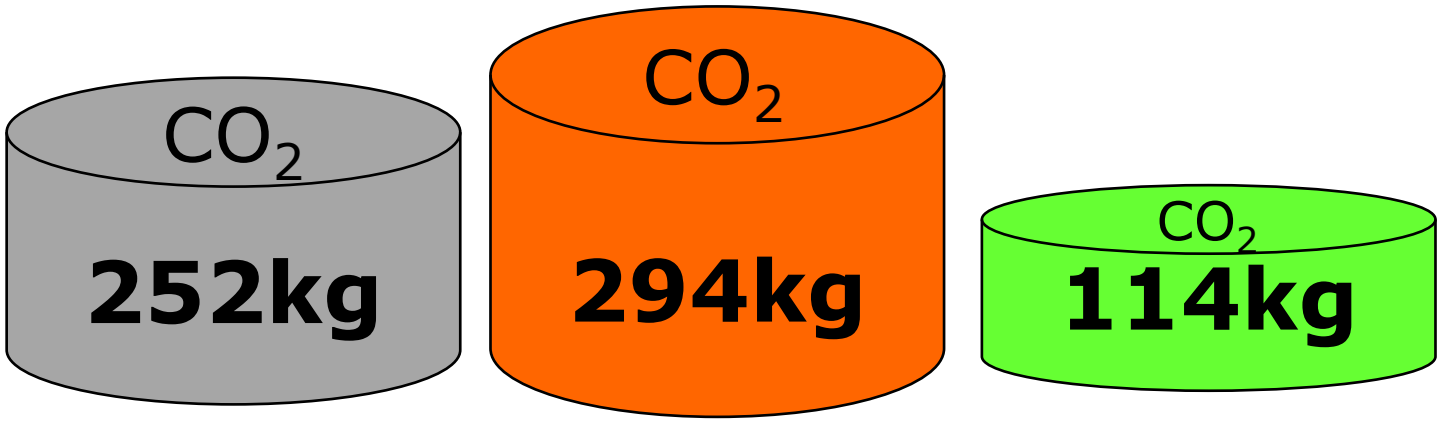
Increase of speed to reduce delay costs!!!

b) Lido/Flight (example)



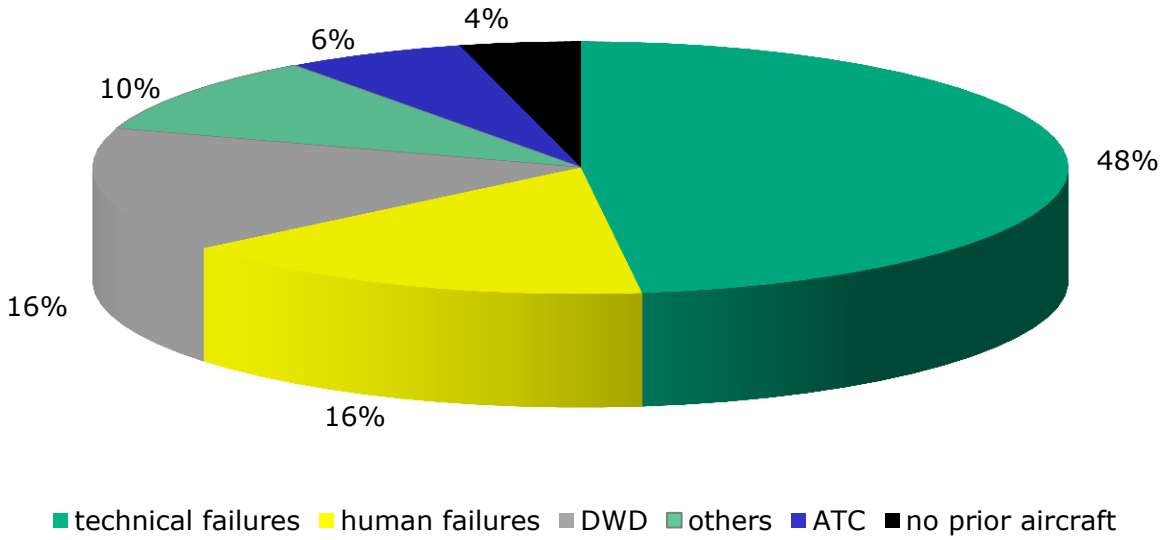
b) Lido/Flight calculation

- test trail of 10 flights
  - OFP forecast: 79,9kg jet fuel
  - PWI: 93,2kg jet fuel
  - real-time wind data: 36,1kg jet fuel



) Testing

- high failure rate → 10 out of 67 data sets were 100% complete



Introduce an automation with smart algorithm and request real-time wind data from more (prior) aircraft!

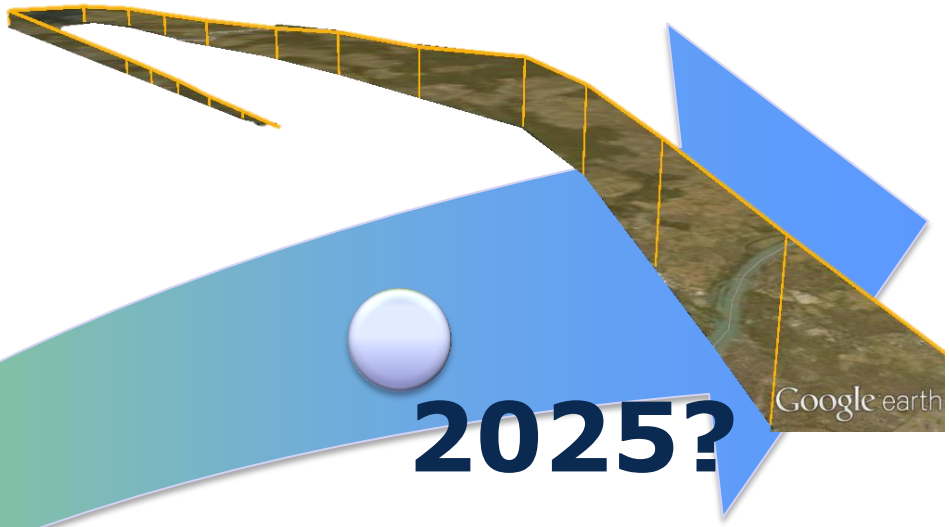
5 Conclusion

- Enhanced Jet Performance Model (TU Dresden)
  - ETA could be predicted more accurate → adjustments of Cost Index possible to avoid delay costs in case of more tail wind or saving fuel in case of more tail wind
- flight planning system Lido/Flight (Lufthansa Systems)
  - displacement of T/D results in significant fuel savings for both wind cases
- test findings from flight trails could be used for developing automation

Direct achievements of this study:

→ technical issues got solved

→ enabling of PWI requests/uplinks for A320-fleet of Lufthansa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