

# PJ18-W2 SOL53B EXE-011

TP improvement and CD&R tools enhancements through ADS-C data

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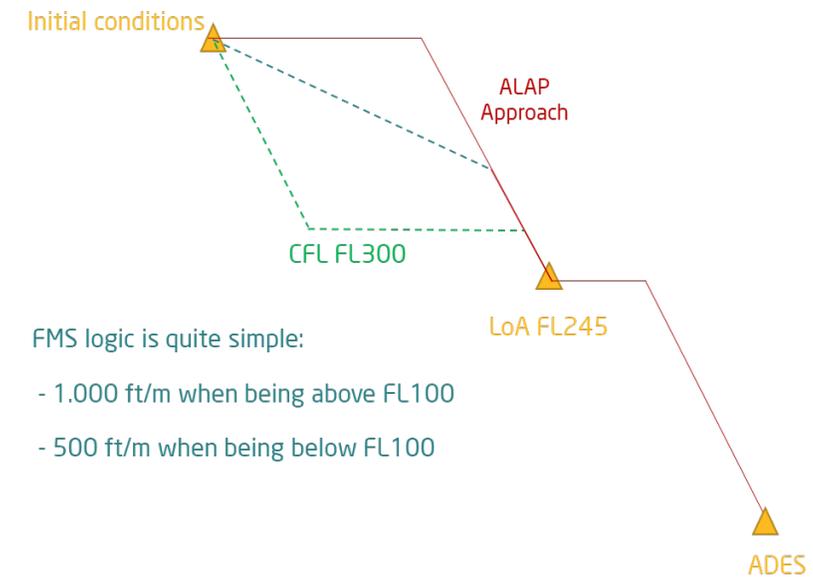


# Main messages

PJ.18-W2 SOL53B EXE011 was conducted by PANSAN and Indra.

The objective of the exercise was to **assess the improvements of ground Trajectory Prediction and Conflict Detection and Resolutions** through:

- The use of the ADS-C Mass
- Better selection of speed using ADS-C data and Mode S data
- The implementation of catch-up maneuvers
- BADA calibration



# Validation methodology



EXE011 validation was a V3 Real Time Simulation (RTS) with a traffic generator providing aircraft and simulated EPP ADS-C data (Indra iSIM Simulator)



The 3-days validation took place in mid-October in PANSNA premises in Warsaw with the use of P\_21/iTEC system



7 Air Traffic Controllers and  
4 pseudo-pilots



# Validation methodology

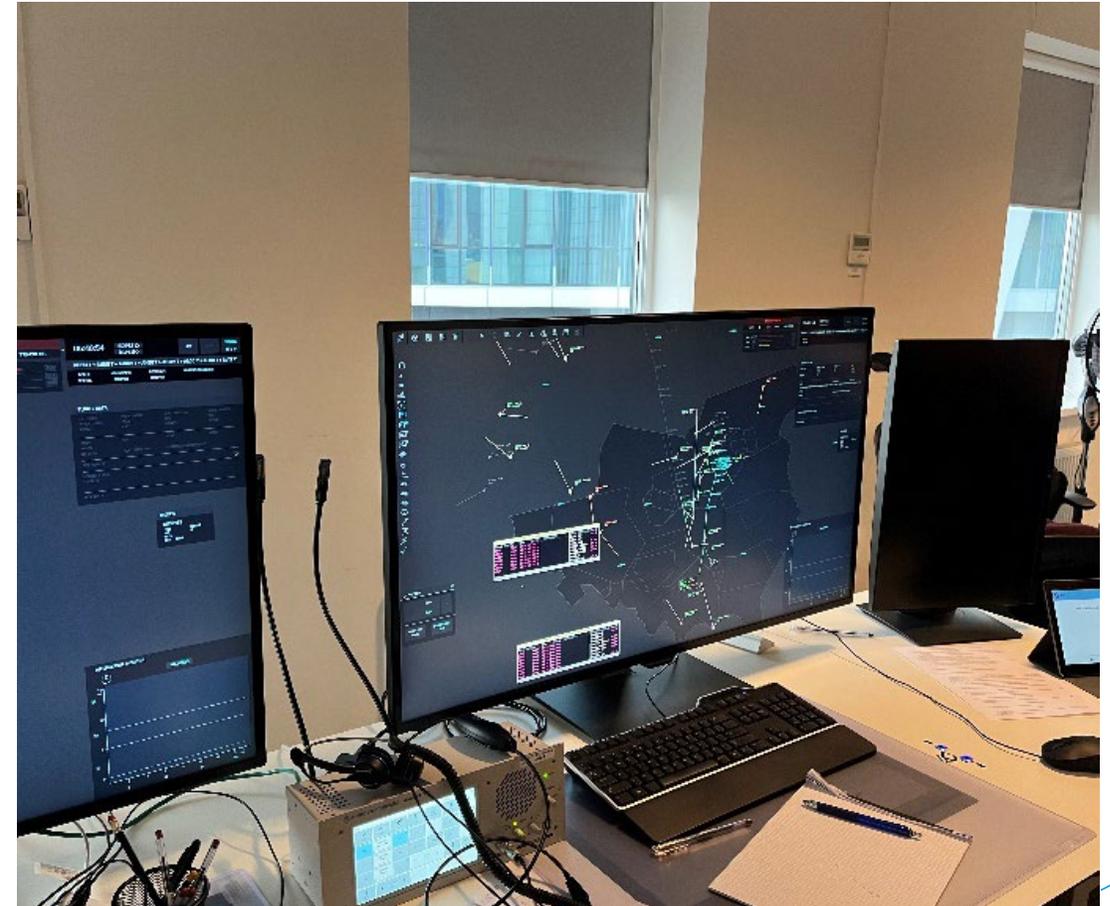
During the operational phase of validation each day we conducted 2 exercise runs.

The first run was a **reference scenario** with the use of the system without TP/CD&R improvements.

The second run was a **solution scenario** with the use of the improved system.

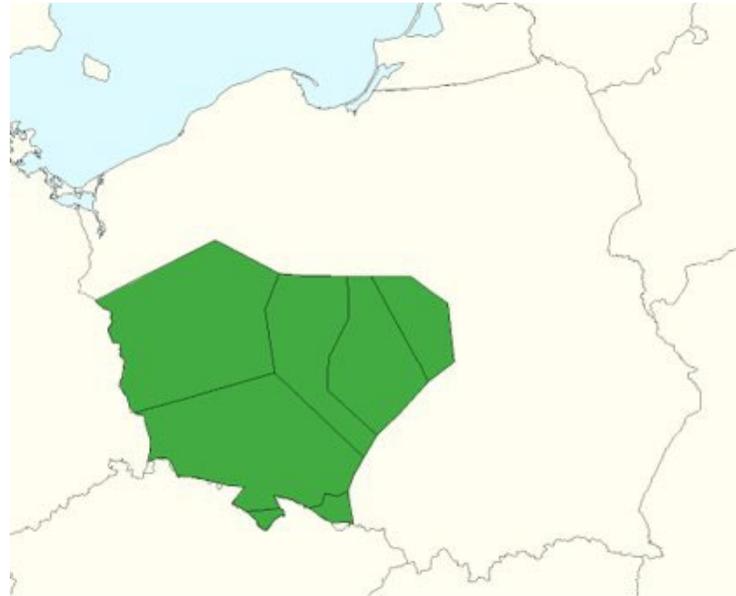
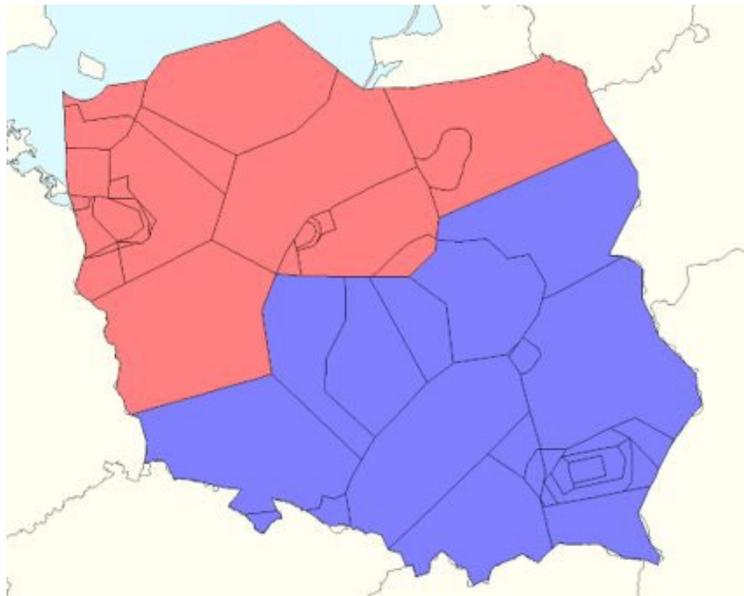
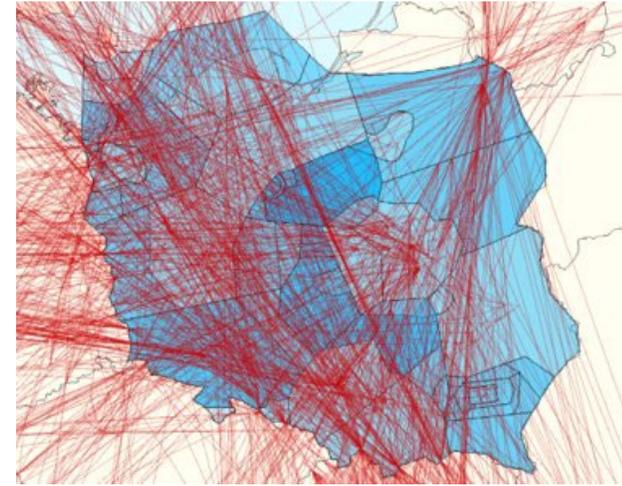
A **medium and high traffic level** scenarios with randomized values of speeds and different climb/descent thrust was used.

There were almost **100%** aircraft equipped with ADS-C EPP in the traffic scenarios.



# Airspace definition and traffic flow

Scenarios were based on real traffic flows in FIR EPWW from 2022. The exercise scenarios were adapted to represent the complexity and volume of traffic in measured sectors as much as possible, and to provide the possibility to validate new functionalities in wide range of traffic configurations.

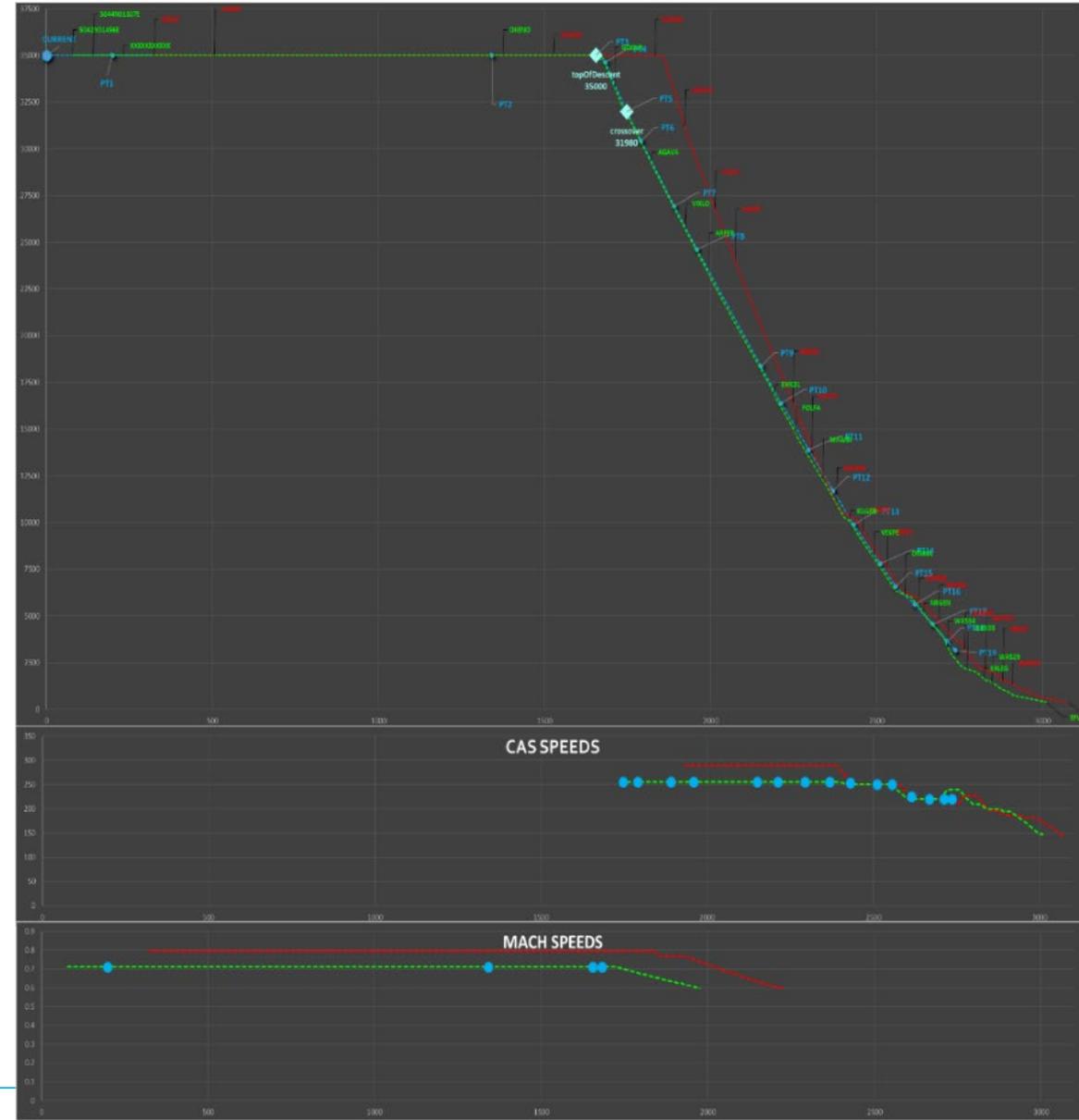


# TP Improvement with ADS-CEPP

A general improvement on the TP prediction was observed. More compliance between ground and EPP trajectory was detected in solution scenario.

However, some limitations due to a few incorrect behaviors of iSIM EPP prediction were detected.

Red Trajectory – Ground TP with no EPP information  
 Green Trajectory – Ground TP with EPP information  
 Blue Trajectory – EPP prediction simulated by Indra iSIM





## Results and conclusions

indra PANSAT

sesar  
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➤ Improved ground trajectory prediction accuracy

🔄 Better conflict detection and resolution

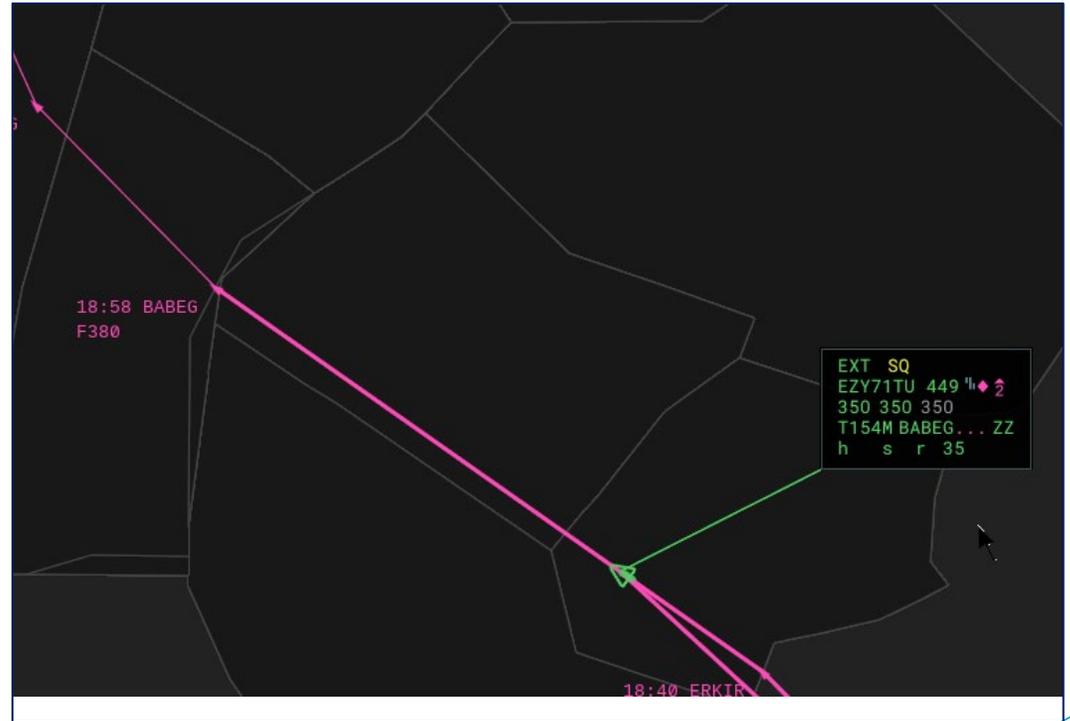
🔔 Reduced number of the false alerts



# Results and conclusions

- Workload
- Airspace capacity
- Route efficiency
- Communications

EPP - LOT388 - PERIODIC (on s01c006)						
POINT-NAME	FL	ETA	SPEED	CONSTRAINT	SPEED SCHEDULE	VALUE
SISLU	F064	12:11:30	K25.0		CLIMB_IAS	K32.1
LEMBU	F057	12:12:18	K22.8		XOVER_ALT	
WA536	F045	12:13:20	K21.9		CLIMB_MACH	M.720
WA534	F032	12:14:16	K22.0		INITIAL_CRUISE	K28.0
WA533	F020	12:15:20	K22.3		FINAL_CRUISE	K29.2
ERLEG	F011	12:16:06	K21.9		DESCENT_MACH	M.720
WA529	F007	12:16:30	K20.9		XOVER_ALT	
EPWA	F004	12:18:56	K19.8		DESCENT_IAS	K26.3
COMPUTATION TIME			12:09:16	MANAGED	L-S-	





# Limitations and recommendations

-  Refresh rate
-  Non-managed mode
-  Coefficient approach
-  Conflict tolerances
-  HMI



CV	C/S	C/S	TIME	NM	LVL
<input type="radio"/>	LOT4TP	LOT2EC	18'	11.0	350
<input type="radio"/>	LOT4TP	LOT388	18'	5.5	350
<input type="radio"/>	ENT4834	ENT4823	7'	0.0	360
<input type="radio"/>	LOT388	LOT2EC	30'	3.3	350
<input type="radio"/>	BT18KY	RYR7KP	35'	4.8	290
<input type="radio"/>	SAS7234	RYR7030	34'	1.9	370
<input type="radio"/>	SAS83Y	RYR41YT	11'	3.0	300
<input type="radio"/>	BT12WT	MYD8416	16'	3.3	380

# THANK YOU FOR YOUR ATTENTION

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