UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Escuela Técnica Superior de Ingeniería del Diseño

A GRAPHIC TOOL FOR AIR TRAFFIC CONTROL

Flight Simulation of Historic Traffic

Corina Yanes Yanes

Grado en Ingeniería Aeroespacial

Escuela Técnica Superior de Ingeniería de Diseño

Universidad Politécnica de Valencia

Tutor: Joan Vila Carbó

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CONTENT

- OBJECTIVES
- MERGE POINT APPROACH
- RELATIVE POSITION INDICATOR
- HISTORICAL TRAFFIC
- PROGRAM DEVELOPMENT
- USE CASE: DUBLIN RW 28
- CONCLUSION

OBJECTIVES

- Study of Holding procedures with focus on the Merge Point approach
- A graphical tool for traffic representation
  - use at TMAs with Merge Point approach
  - provide a platform, open to introduce and test innovations in console of ATC ⇨ RPI
- Simulation of historic traffic from .so6 files provided by EUROCONTROL
  - Use Case: Dublin Runway 28

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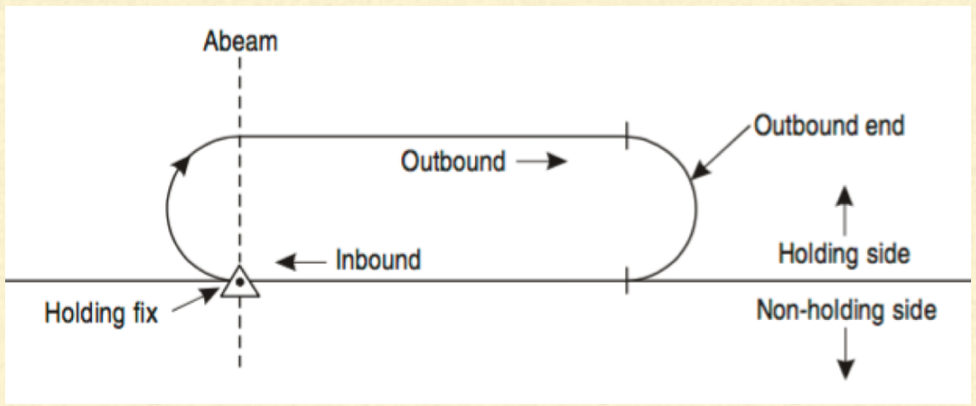
HOLDINGS

P-RNAV ⇨ change of arrival procedures

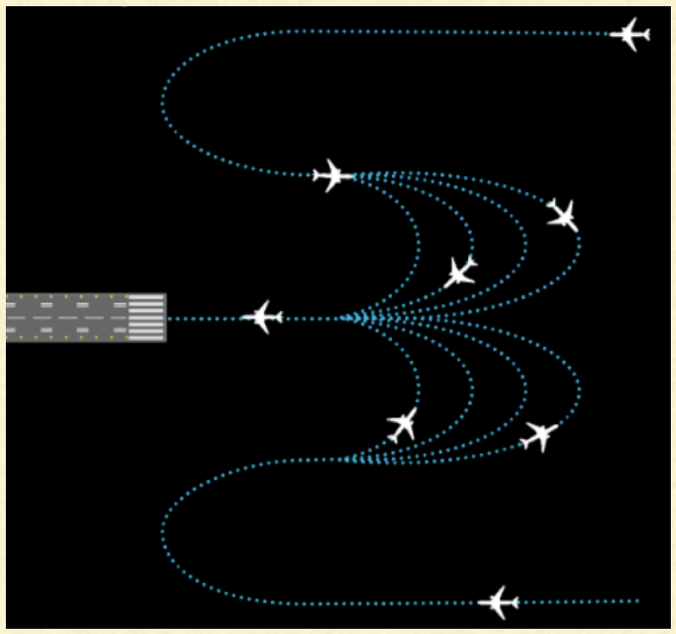
↓

Vertical Holding Stack ⇨ Linear Holding Stacks

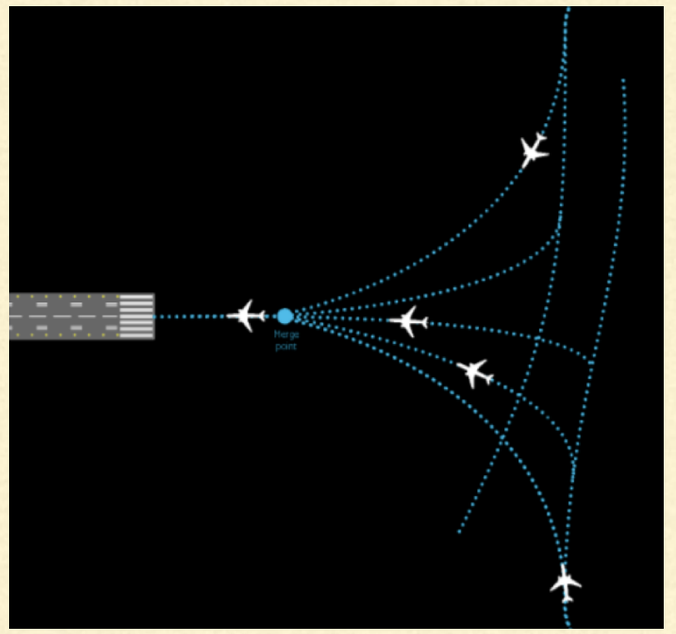
Traditional Holding



Trombone Holding

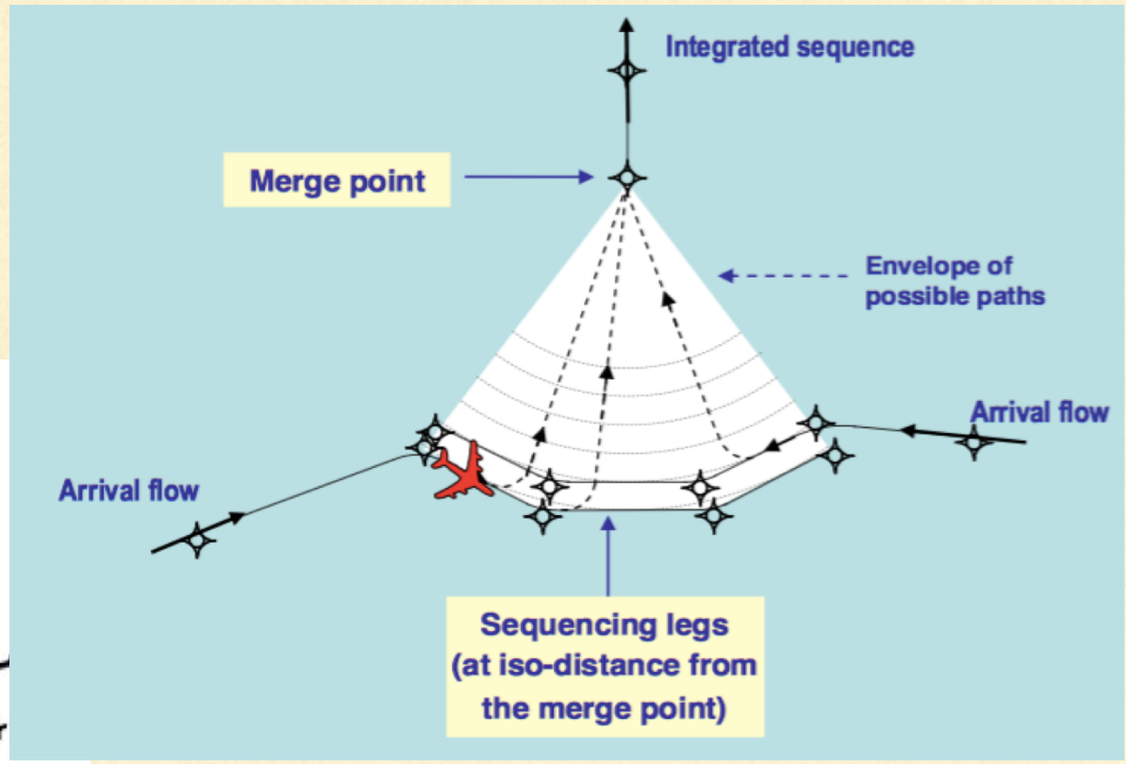


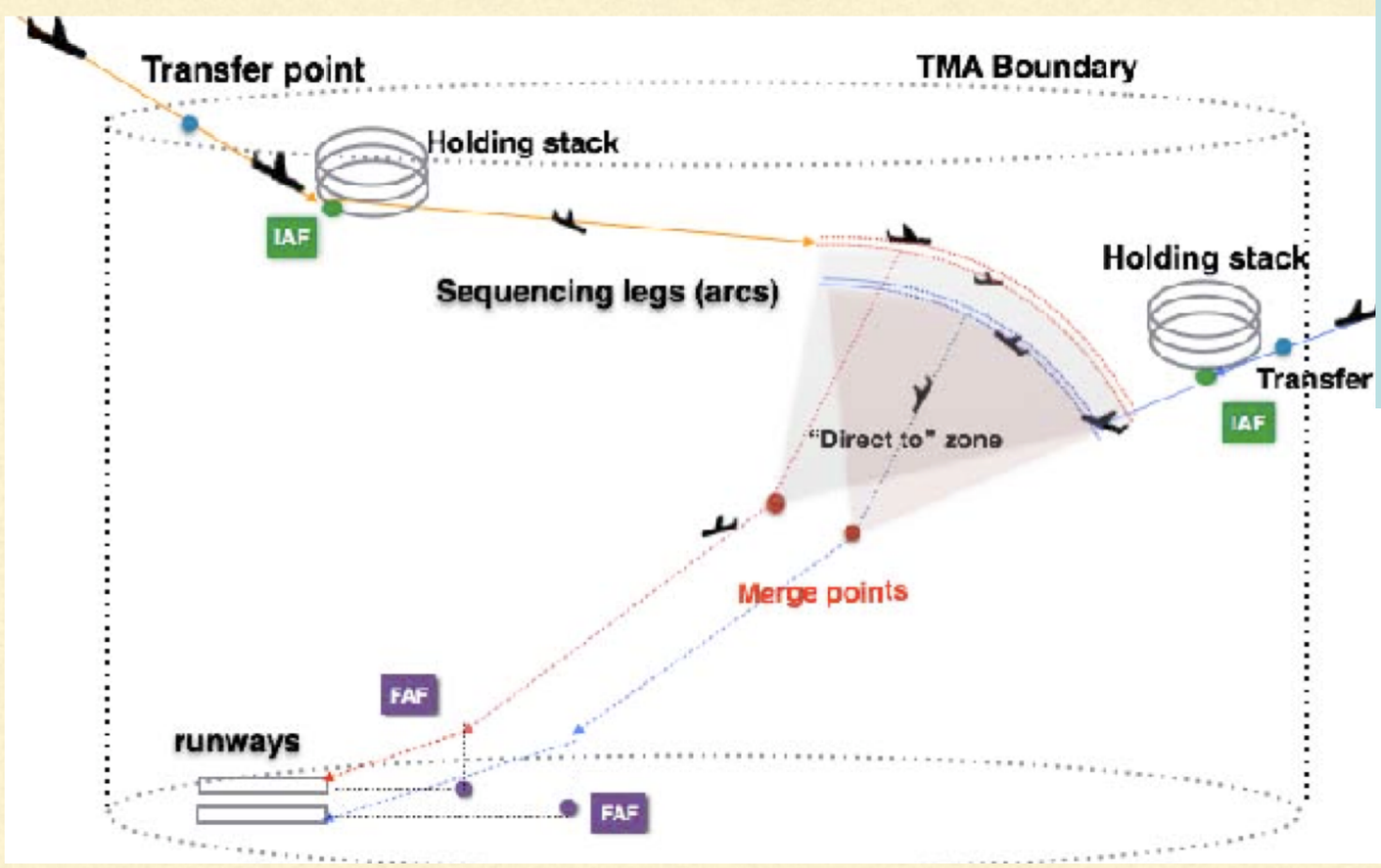
Point Merge Holding



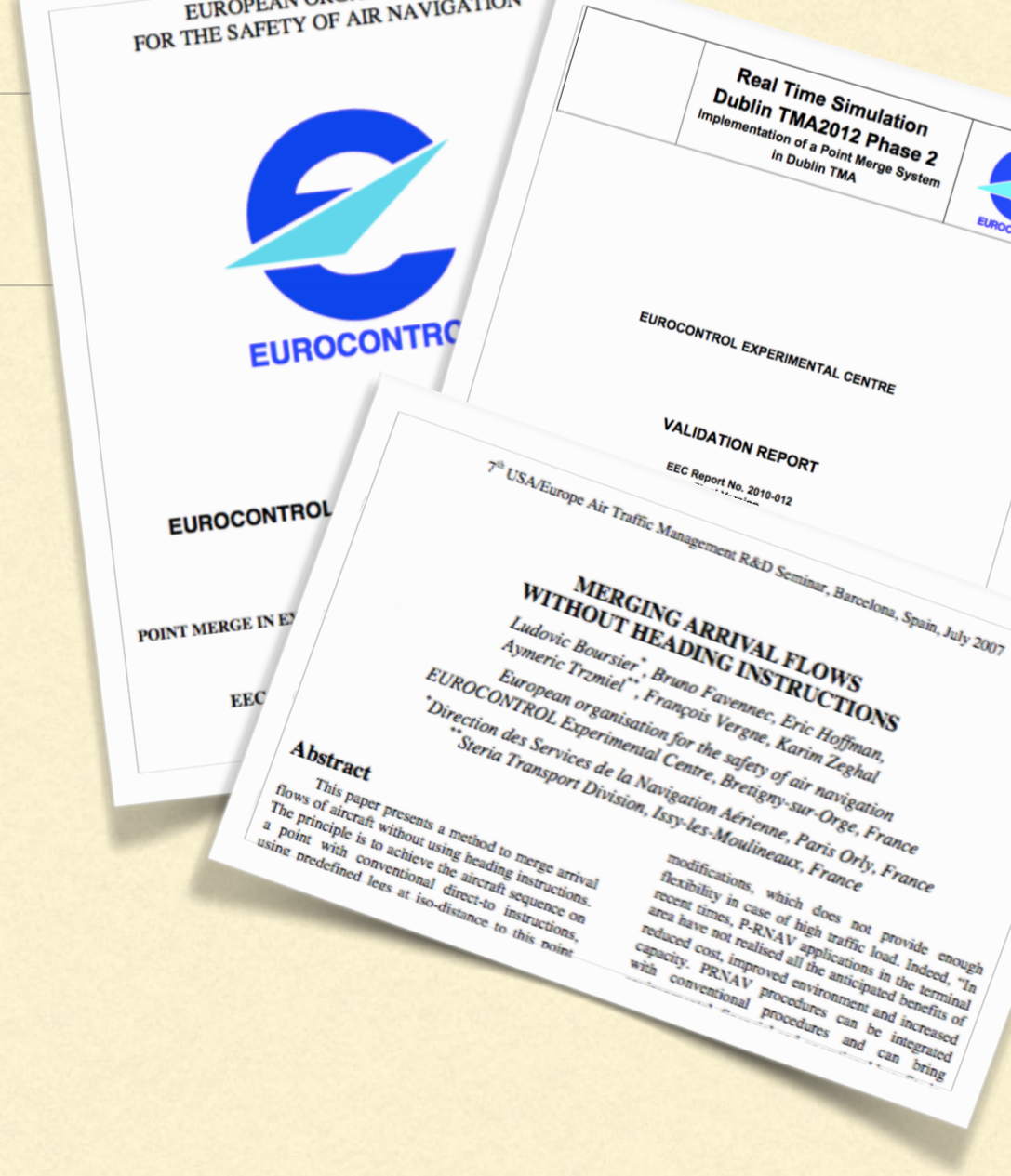
POINT MERGE APPROACH

- Developed by Eurocontrol Experimental Center
- One Merge Point where all possible routes encounter
- Sequencing legs, placed at iso-distance from the MP and forming an envelope of possible paths to the MP





ADVANTAGES



- Controller side: reduced workload
  - less communication (fewer messages)
  - less instructions
  - more predictable traffic flows
    - increase in capacity limit
- Increase in sectors' capacity limit
- Reduces holding
- Linear holds → higher level
- Continuous descent
- Increase in safety

→ Fuel saving and noise reduction

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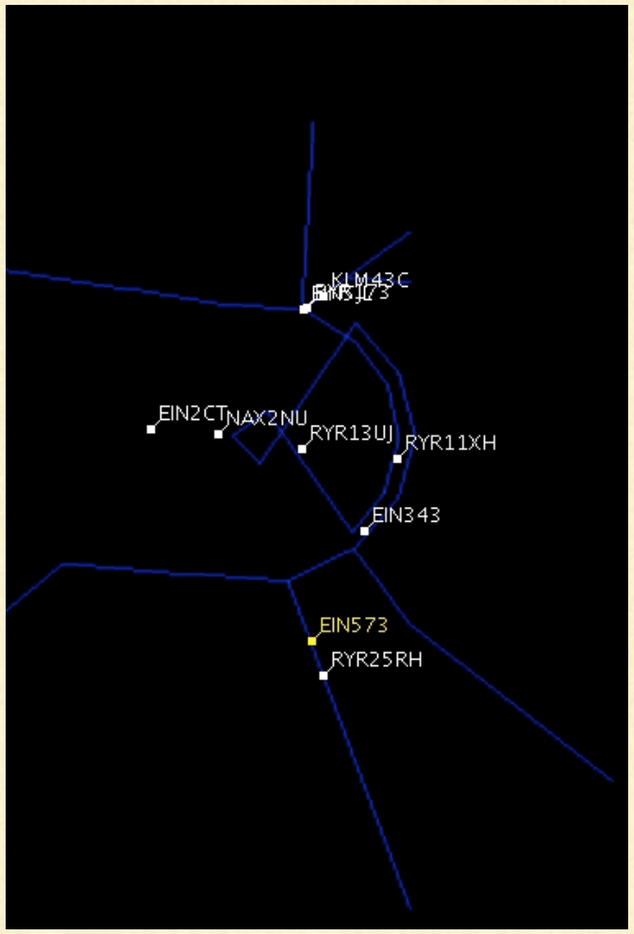
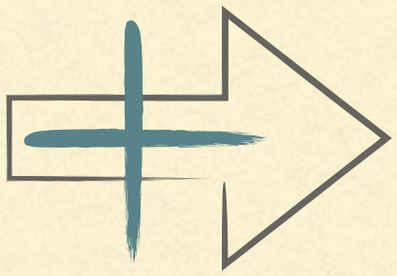
RELATIVE POSITION INDICATOR

- Tool to assist managing traffic flows in the TMA.

- No need for special equipment installation.
- Indicates position of aircraft relative to the MP
- Places all aircraft on one line.





- Application of speed control on an early stage of approach
  - aircraft arrive at Merge Point with necessary separation
  - reduction of vectoring for delaying aircraft

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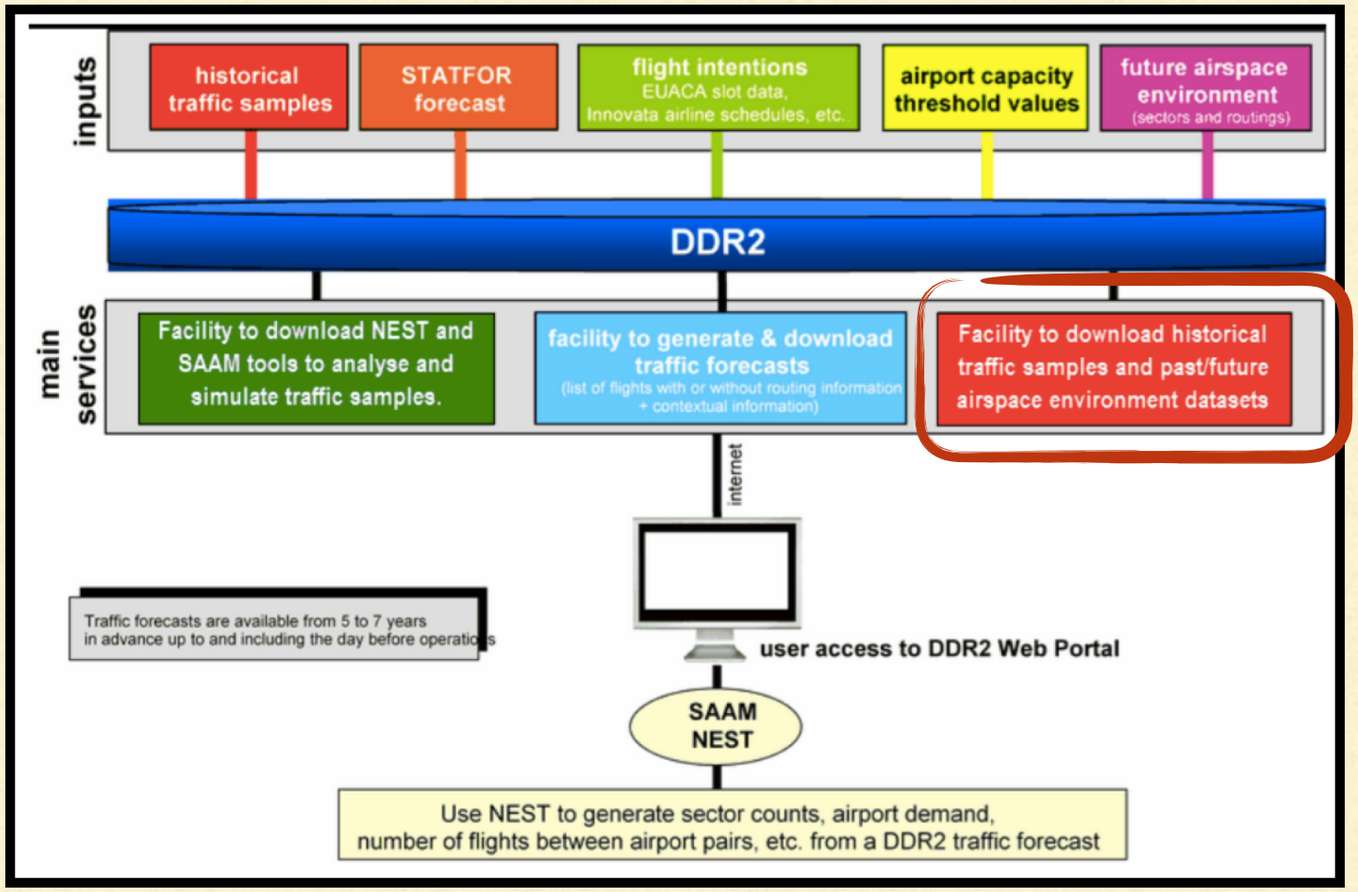
EUROCONTROL: DDR2 AND SO6

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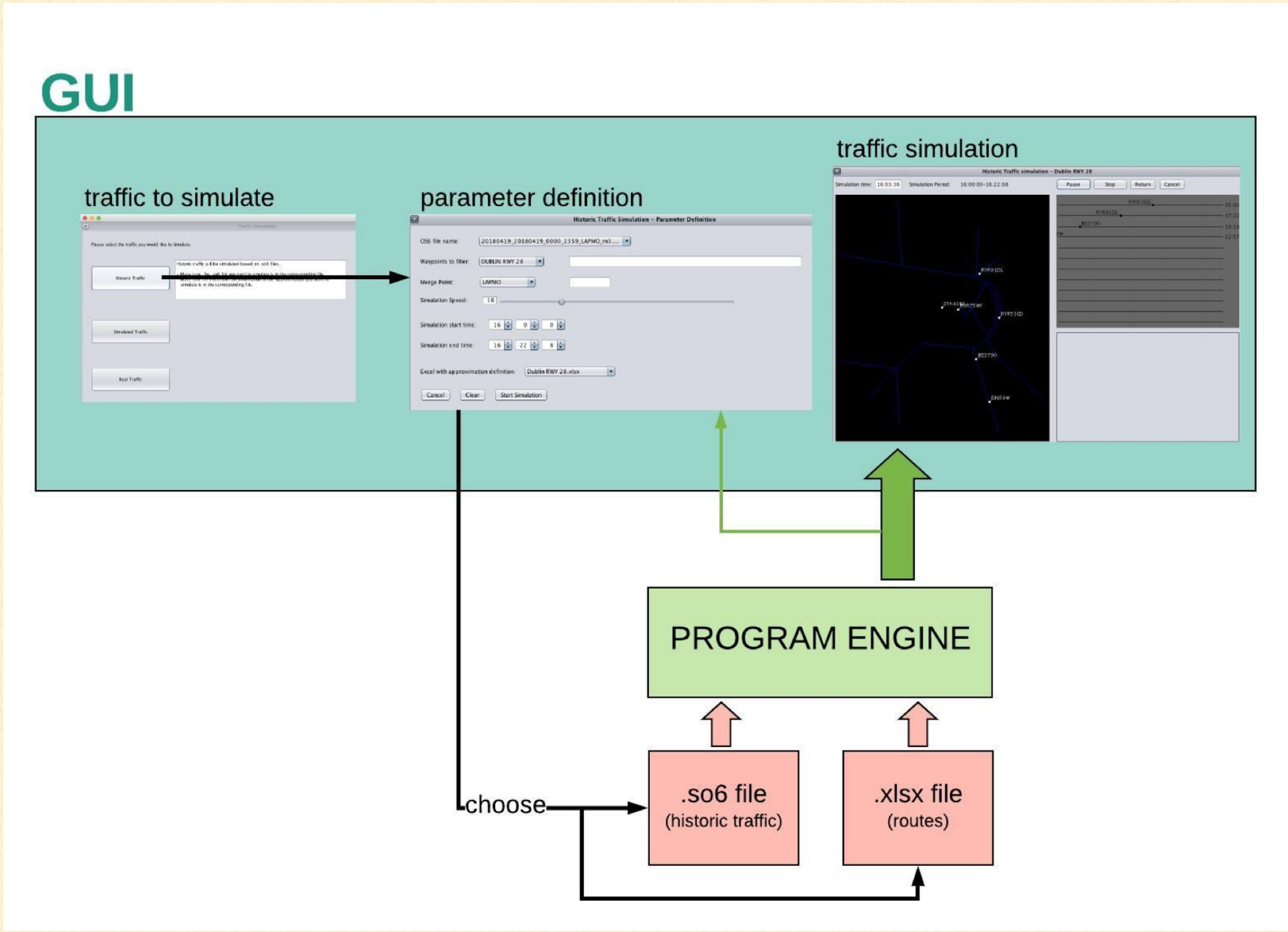
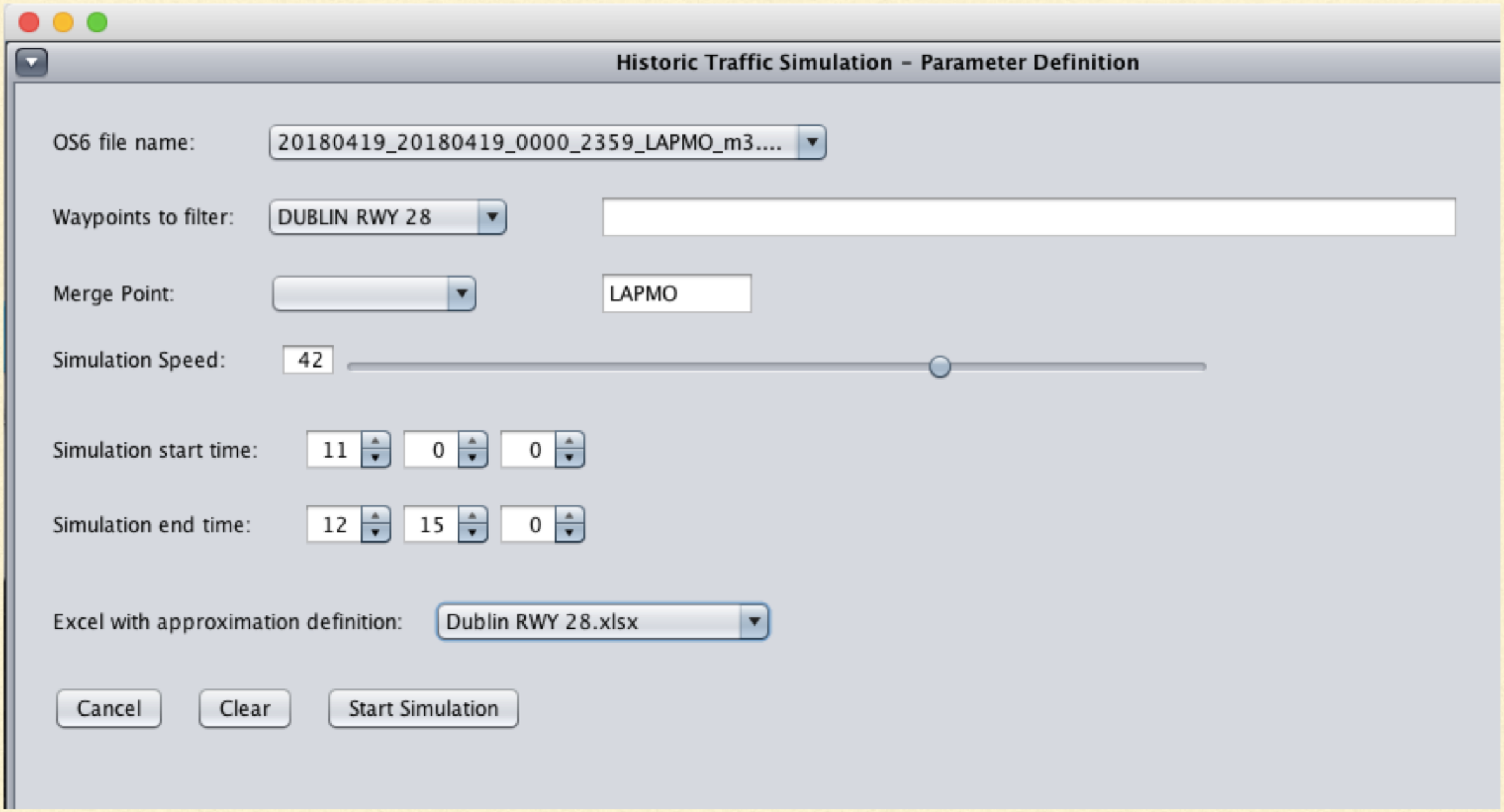
PROGRAM REQUIREMENTS

- The tool should be designed to simulate historic, simulated and real traffic.
- The tool should decode .so6 files from EUROCONTROL.
  - filter traffic information after certain waypoints
- The graphic interface should:
  - inform the user in case there are any errors in the parameter input
  - include a RPI
  - show the simulation time to the user
  - provide information about a chosen flight
- The program should implement two interfaces: a programmatic interface and a graphical interface.

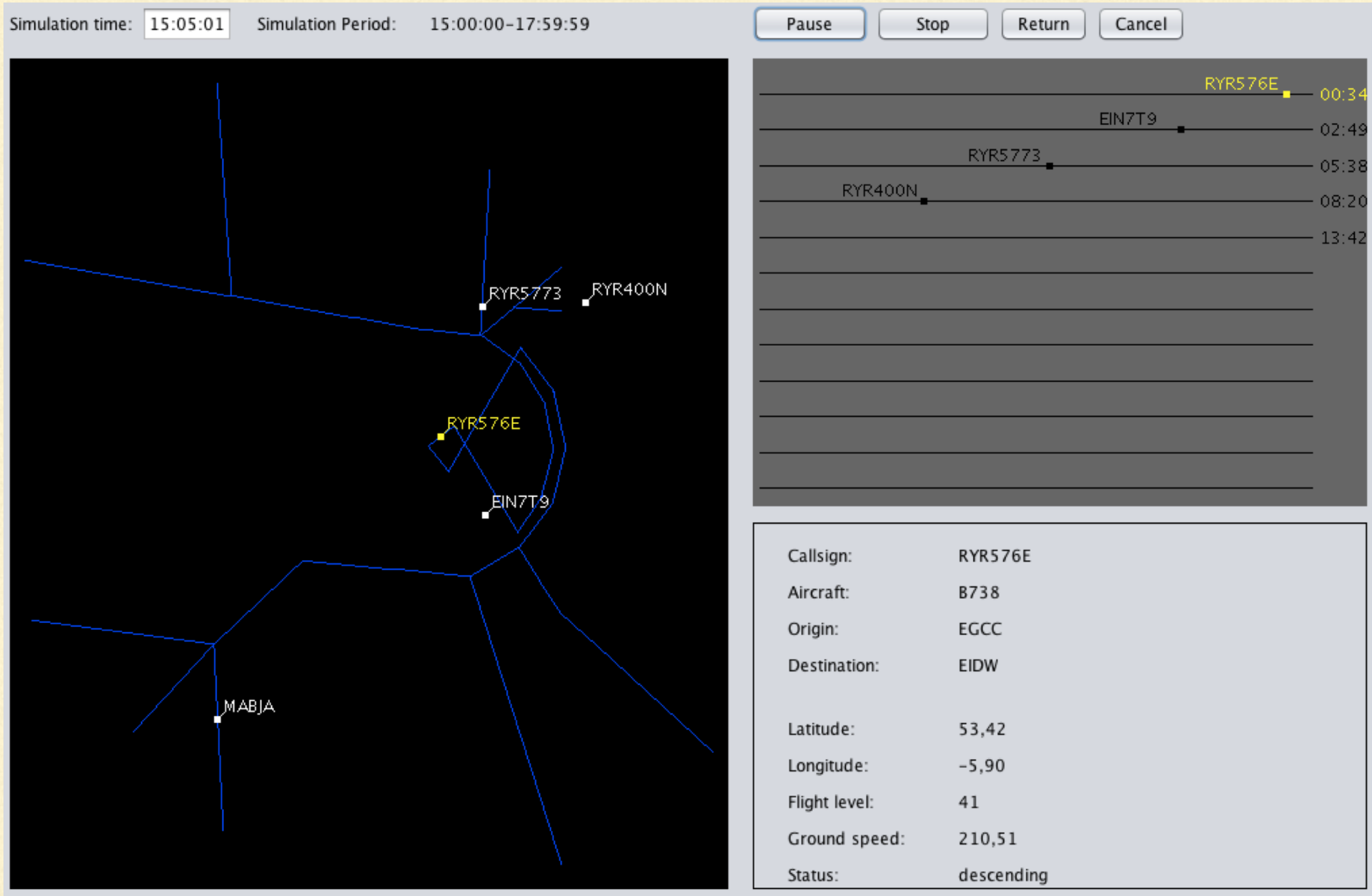
PROGRAM DESIGN



PARAMETER DEFINITION



SIMULATION WINDOW

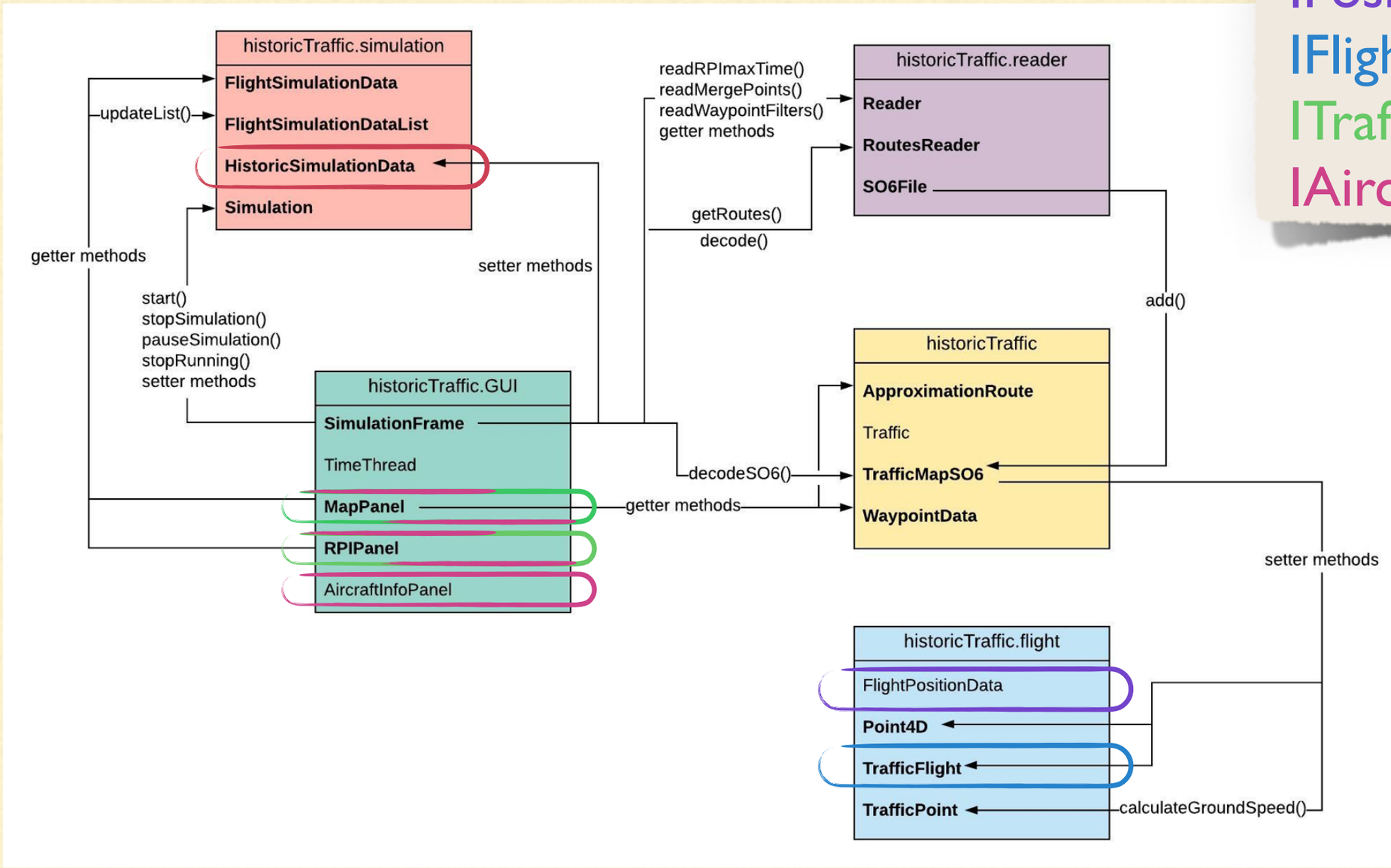


PROGRAM IMPLEMENTATION

OBJECT ORIENTED DESIGN

UML FORMAL DESCRIPTION

ISimulationData
IPositionData
IFlight
ITrafficListener
IAircraftDataListener



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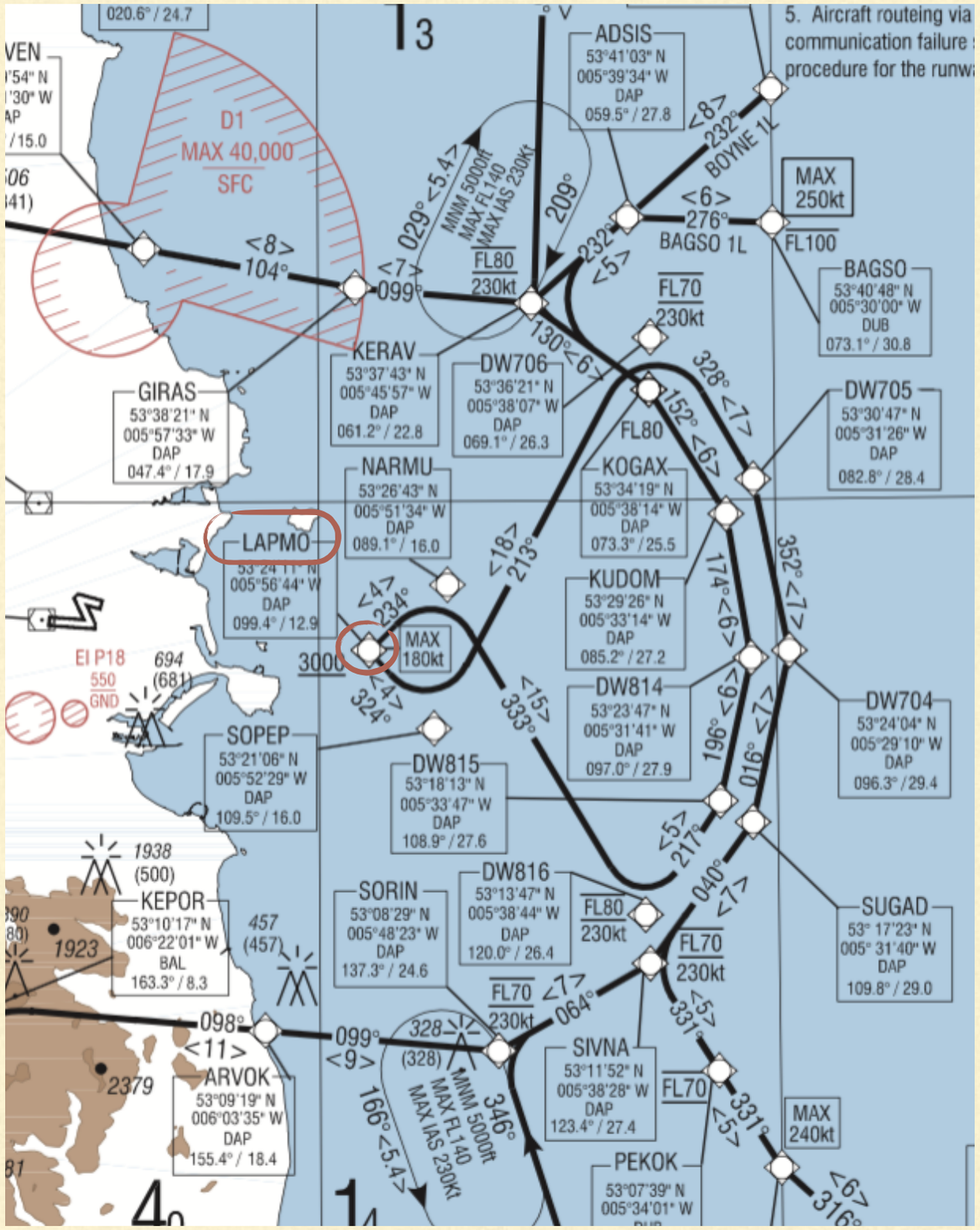
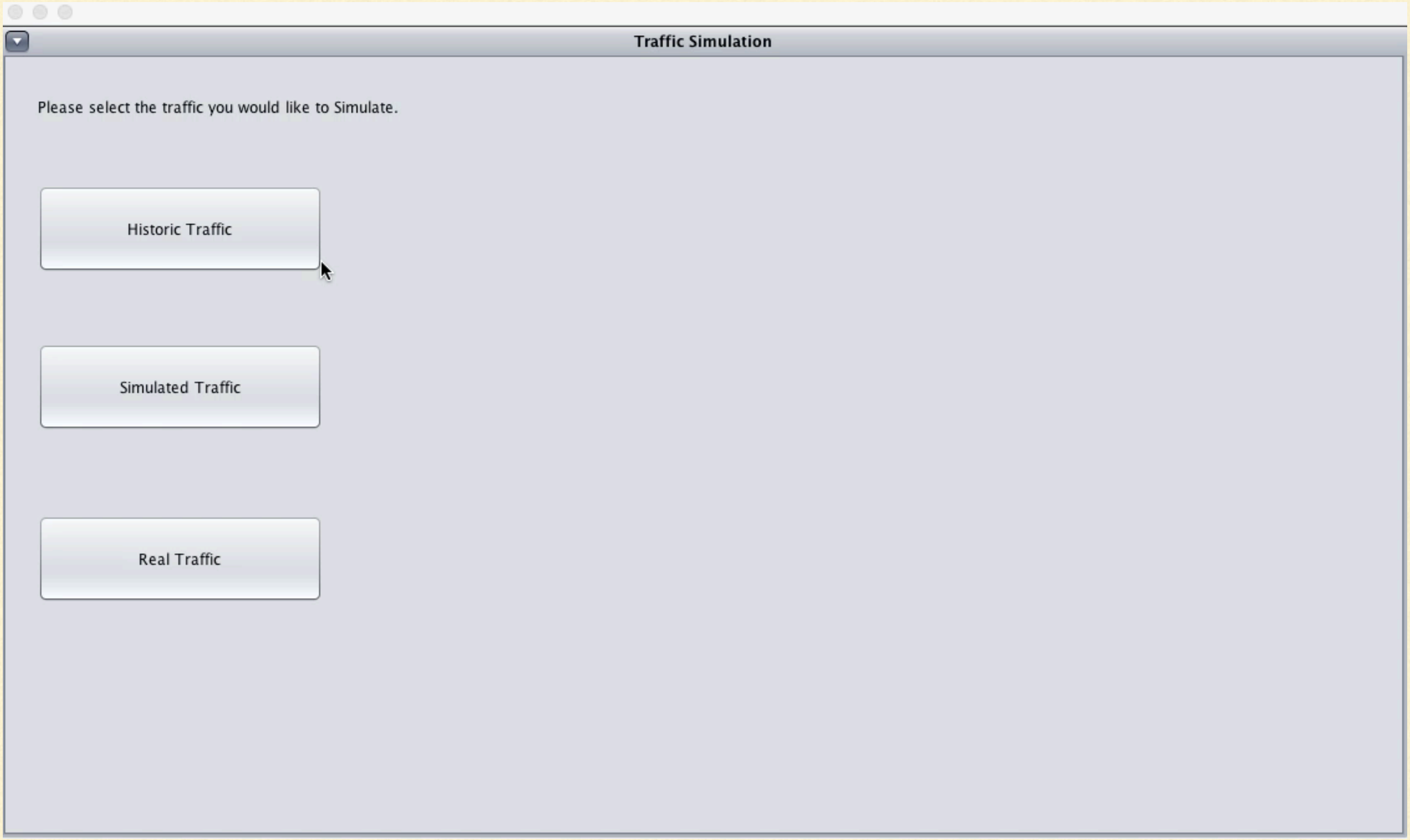
USE CASE: DUBLIN RUNWAY 28



- Introduced in December 2012
- Positive feedback from airlines and controllers
- Northern Sequence legs: FL80
- Southern Sequence legs: FL70
- IAS: 230 knots
- Two traditional holding patterns

USE CASE: DUBLIN RUNWAY 28



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CONCLUSION

- Merge Point approach is a procedure with a number of important advantages.
- The developed program fulfills the defined requirements and provides a platform to integrate and test new tools.
- The RPI implementation in the tool has the potential to increase the efficiency of Merge Point operations.
- The presented project is only the first approach to the development of a powerful tool to with the potential to add new value to the controllers' work environment.

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THANKS FOR YOUR ATTENTION

Corina Yanes Yanes corinayanesy@gmail.com