## SUPEROPT- Supervision of Route Optimizers

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### Research Questions

How to make numerical trajectory optimizers more suitable for human supervision?

### Research Scope

Research to date has identified that optimisation offers a powerful and flexible tool for trajectory-based ATM operations, applied at a variety of scales of decision making, but rarely considering interaction with a human. This human interaction is challenging to achieve, as trajectory optimisers typically involve complex search processes and are sensitive to their input parameters. However, the trajectory optimiser is based around an internal mathematical model of the system, which will inevitably fail to capture all aspects of behaviour, so human supervision is still very important. This research seeks avenues for input from the supervisor as well as more meaningful feedback from the trajectory optimiser about its results.

### Research Results

SUPEROPT has found mathematical translations between human ATM strategies and mathematical constraints on trajectory optimisers. Demonstrations have shown that the methods work as expected and hence offer the potential for a supervisor to have meaningful control over a trajectory optimiser.

Overall, the project has shown ways to employ trajectory optimisers at low levels of automation. However, trajectory optimisers can pursue more complex decision making than human controllers (e.g. cooperative resolution of conflicts by changes to multiple trajectories) and significant human factors challenges remain open.