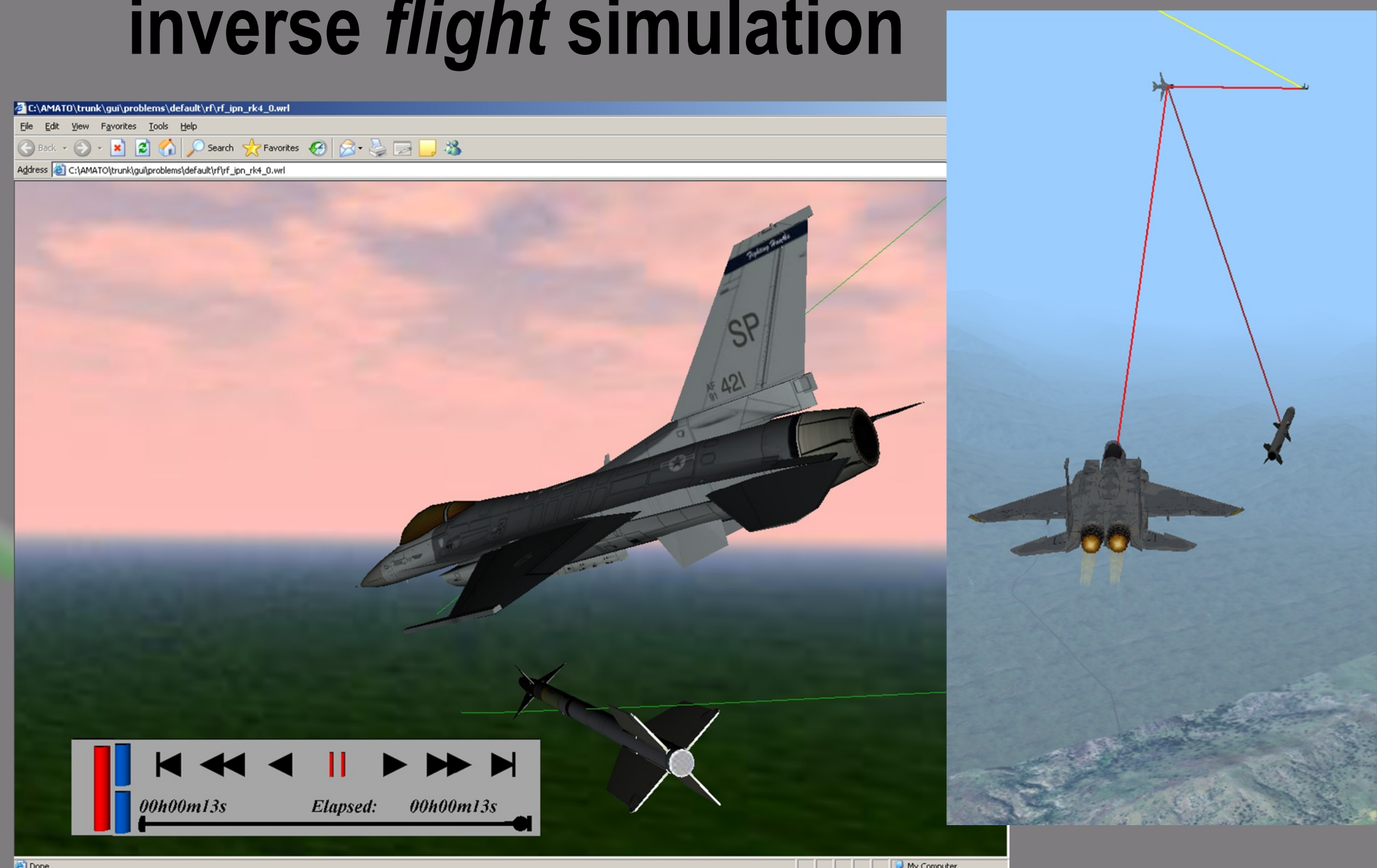
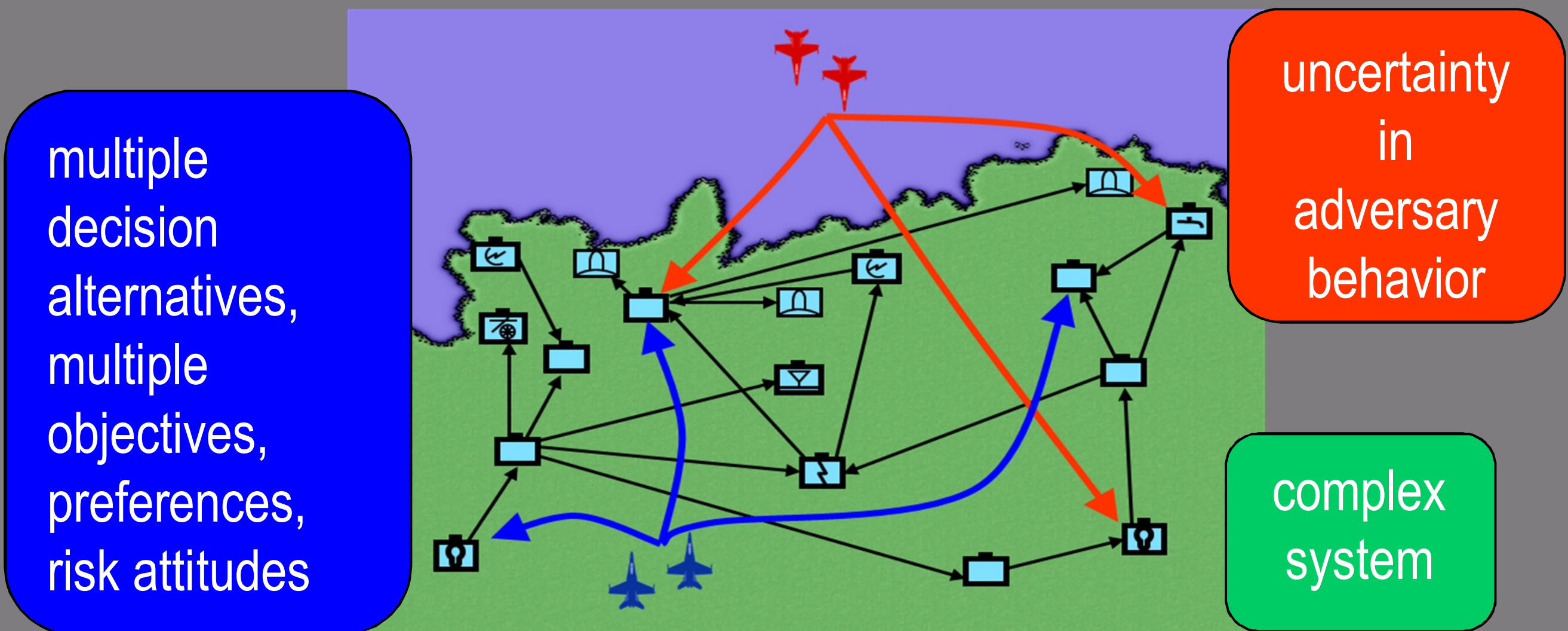


SIMULATION AND OPTIMIZATION OF OPERATIONS

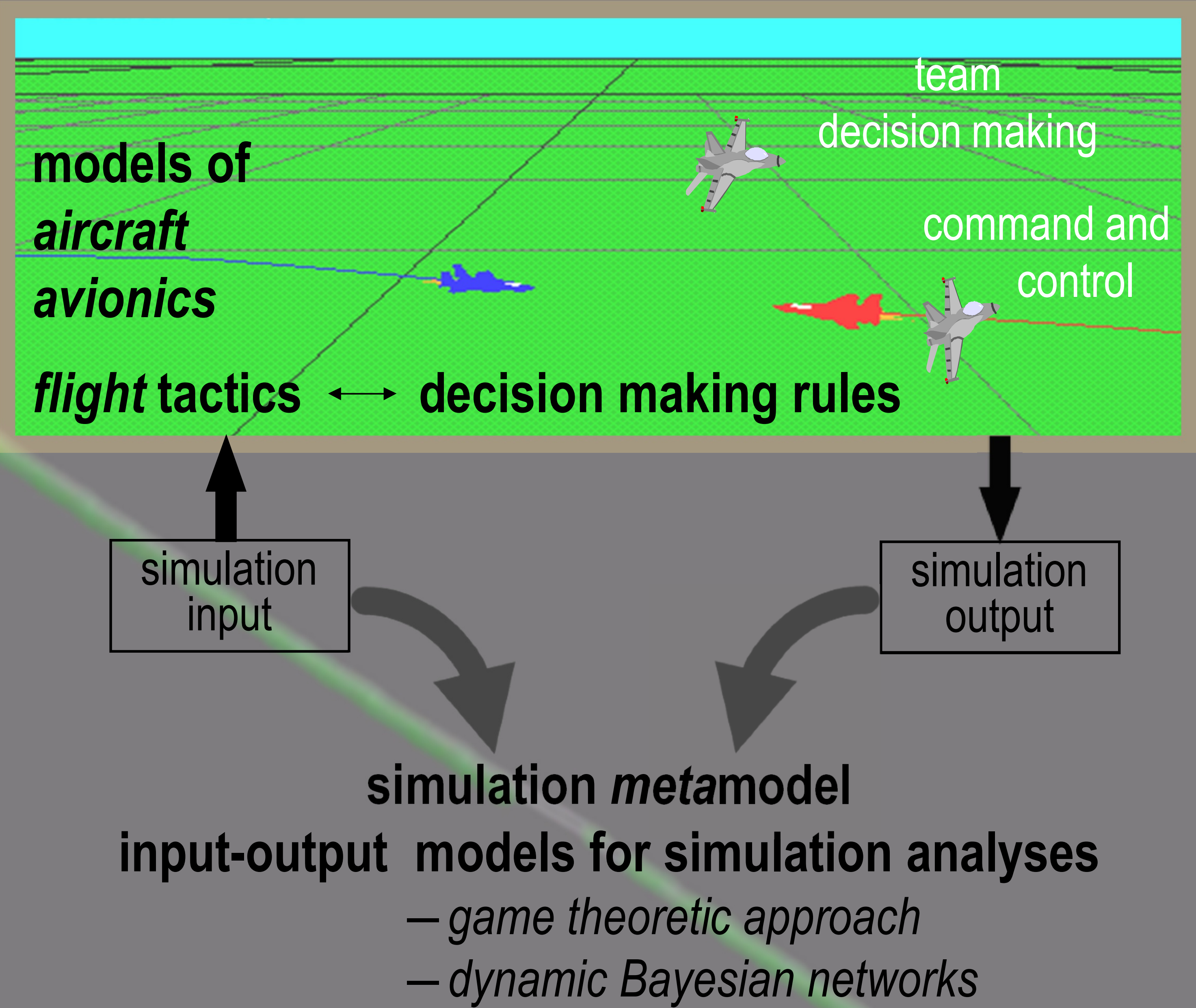
aircraft trajectory optimization
missile avoidance
inverse flight simulation



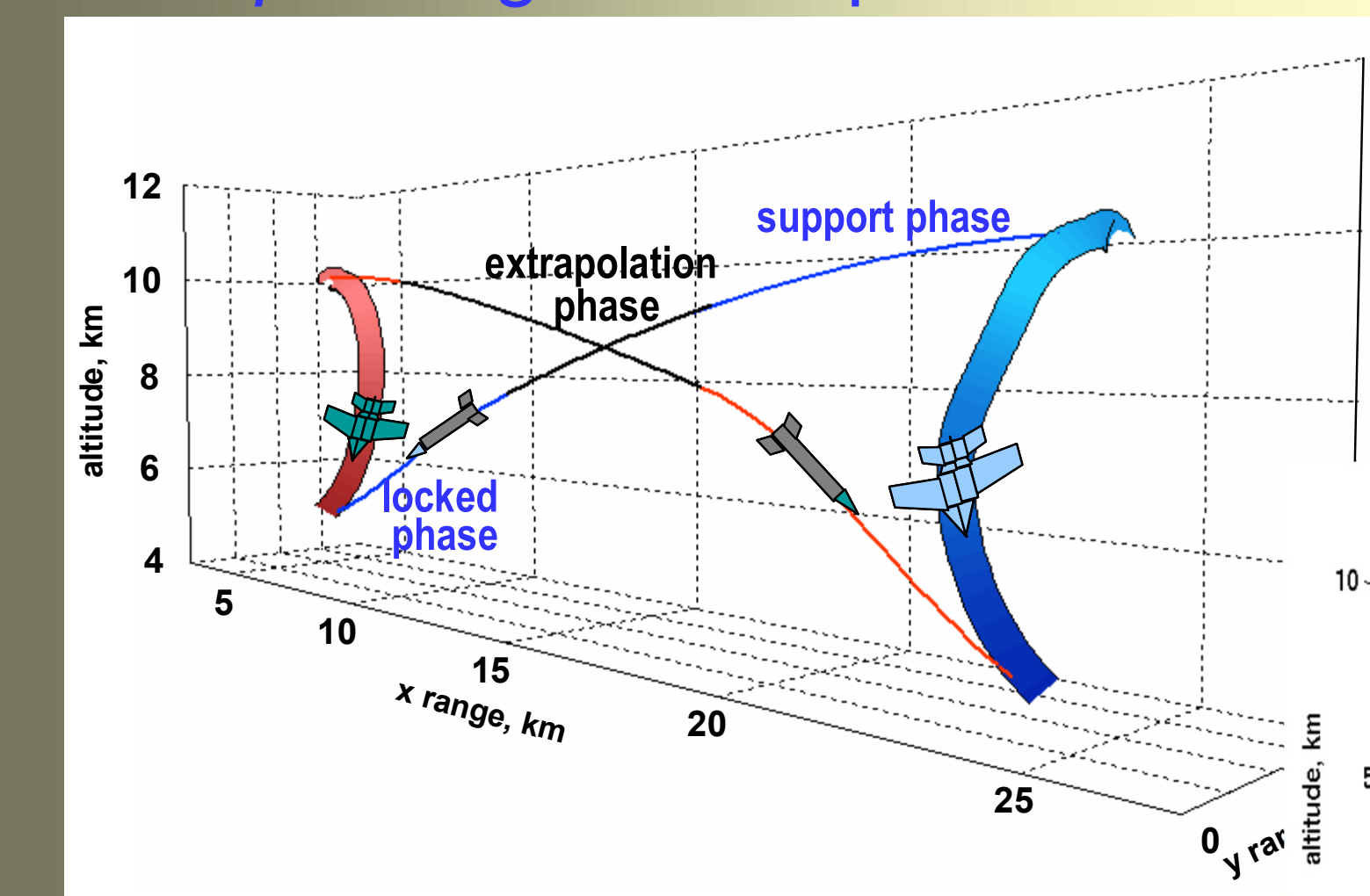
planning effects-based operations
multicriteria influence diagrams



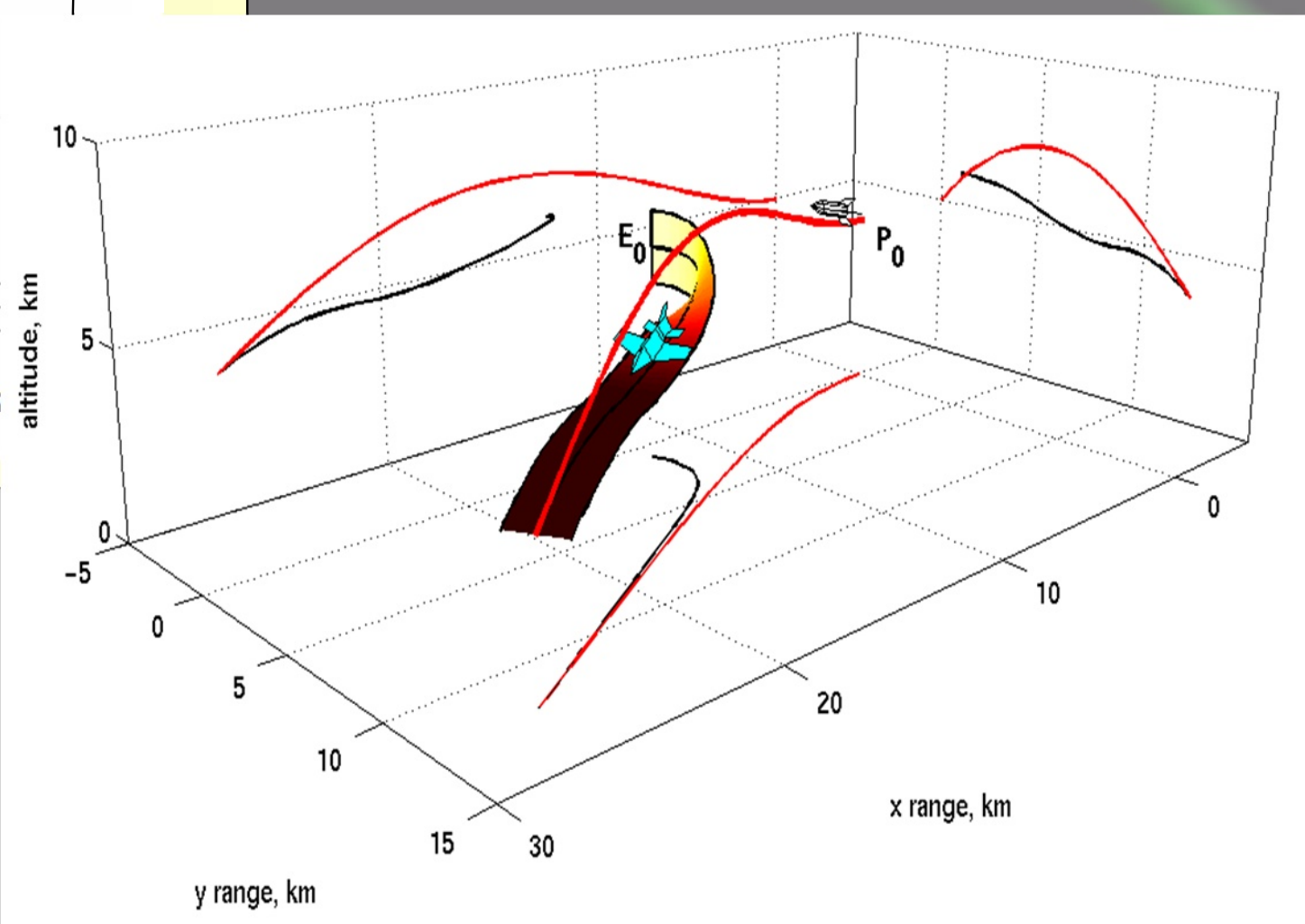
discrete-event combat simulation



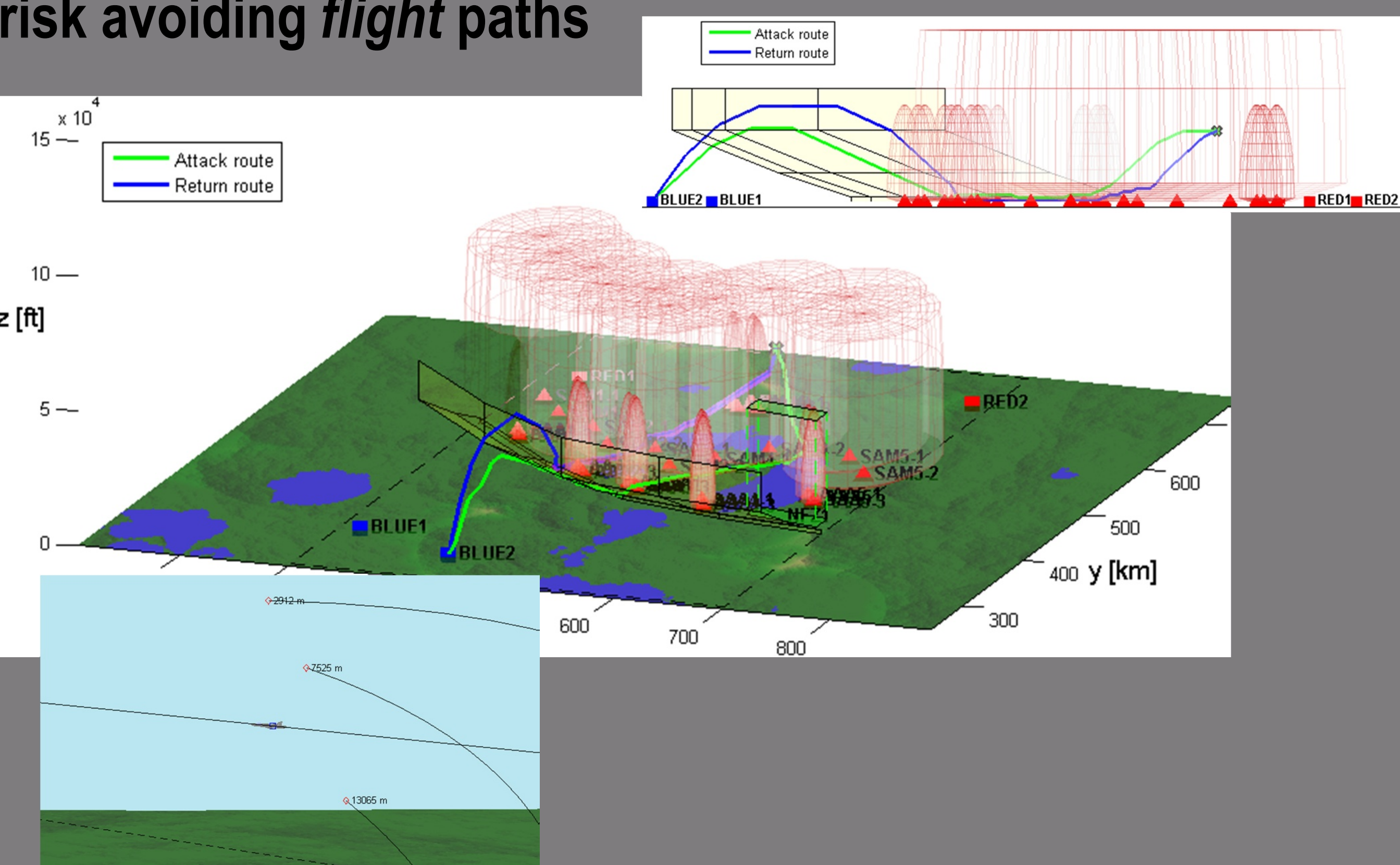
Time optimal guidance phases of missiles



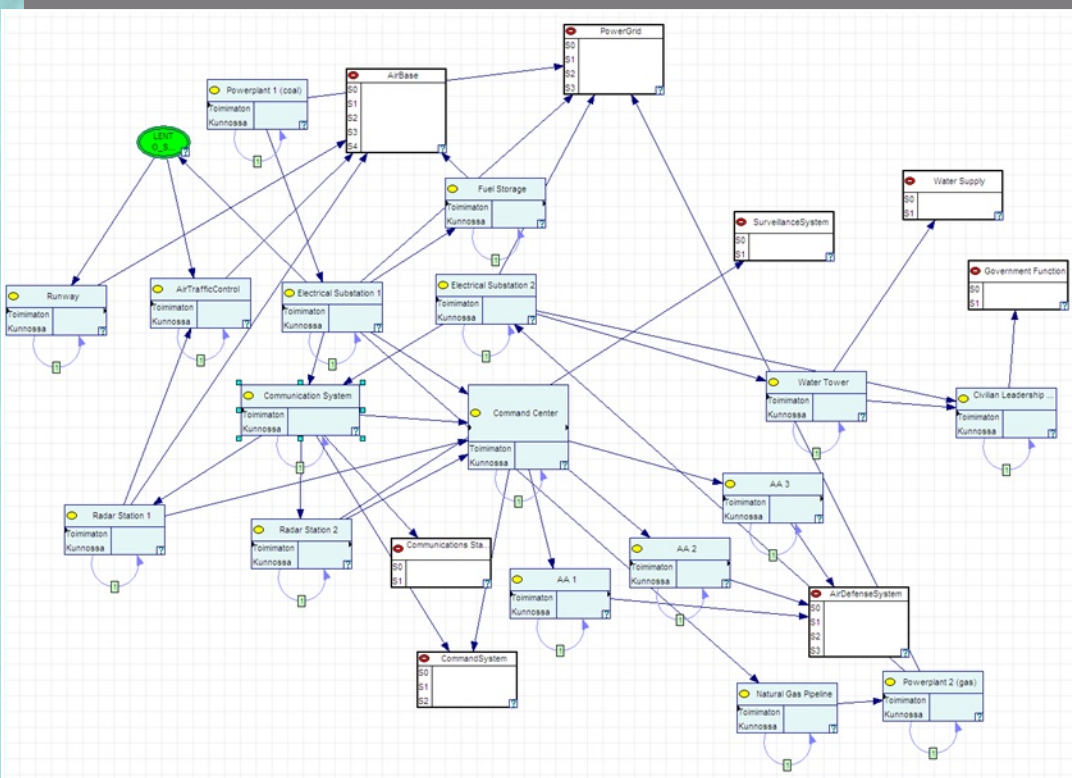
zero-sum pursuit-evasion game



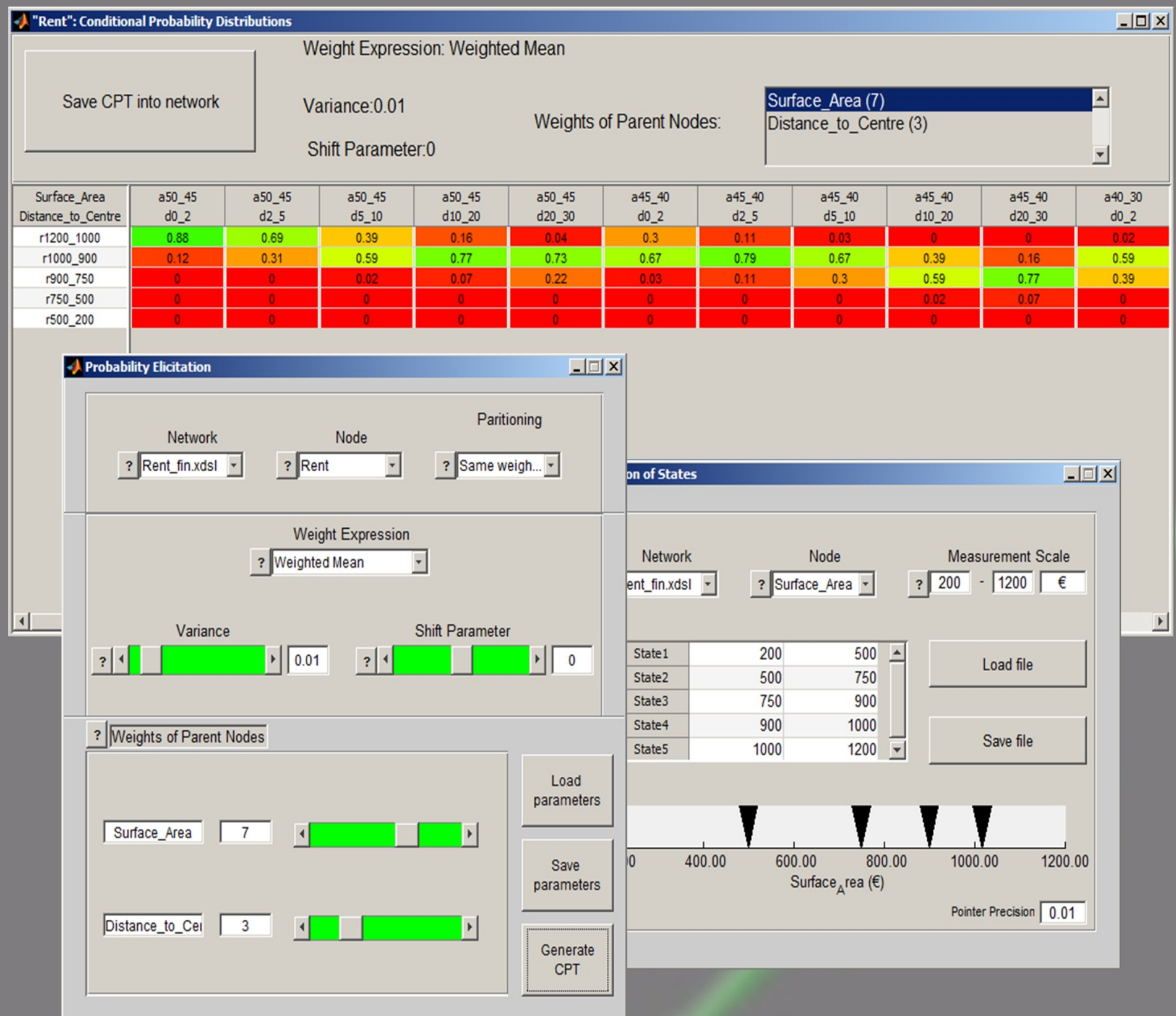
multicriteria network optimization
risk avoiding flight paths



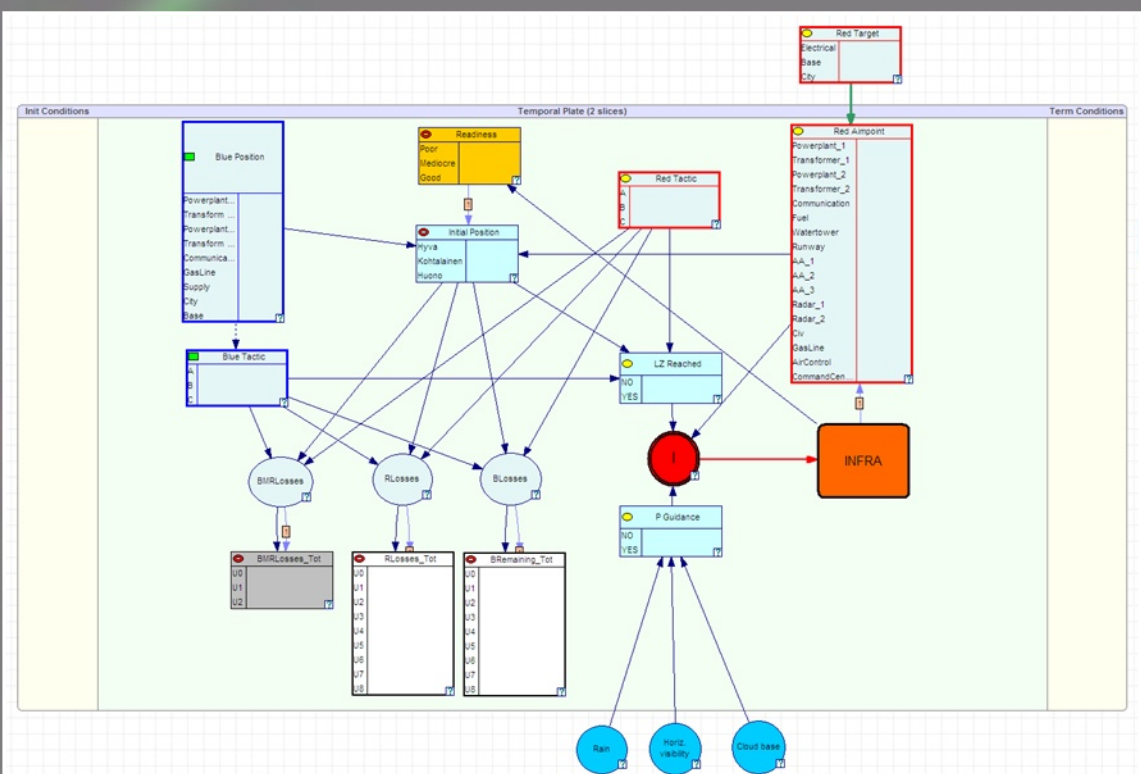
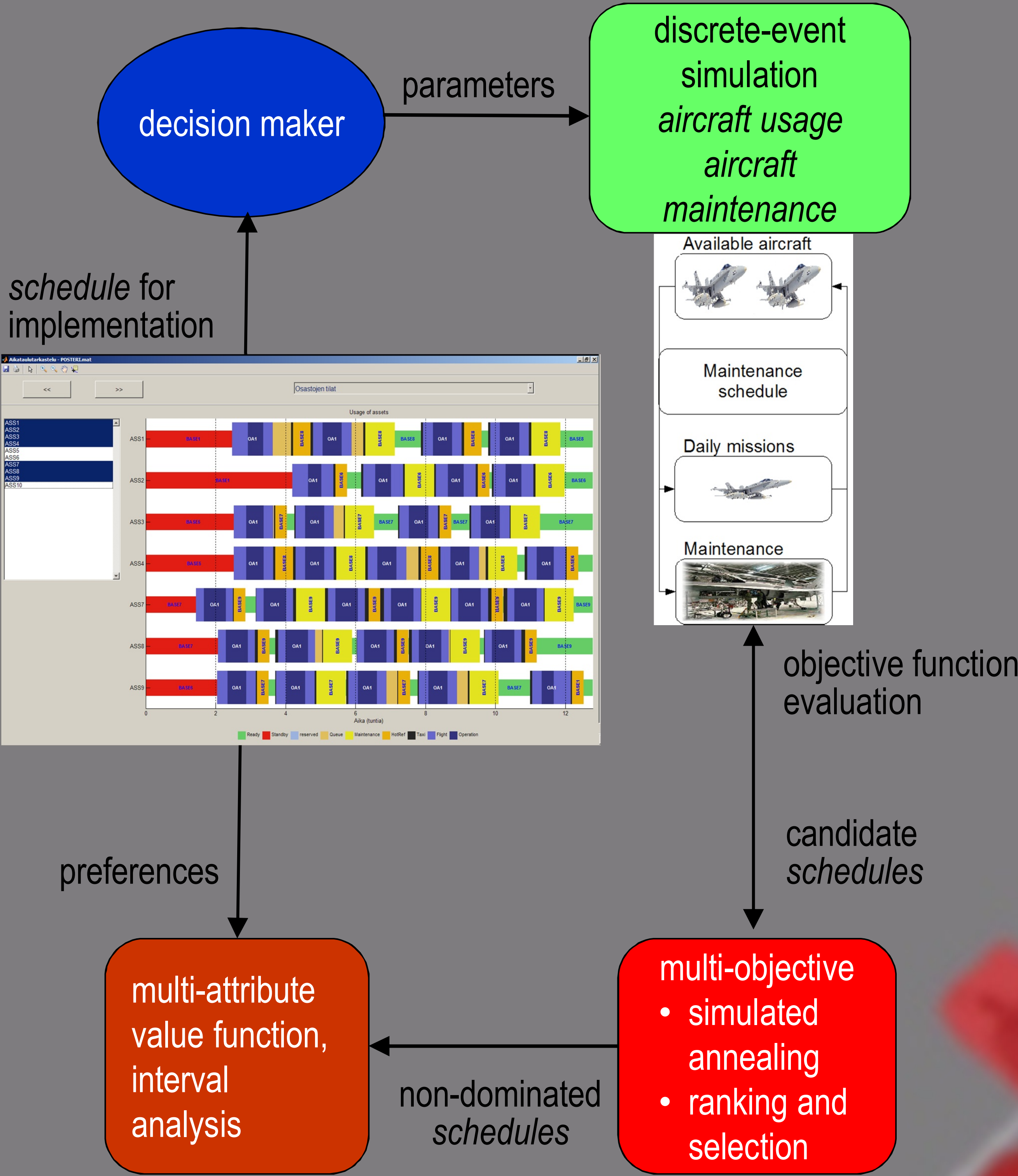
Bayesian networks
analysis of radar systems



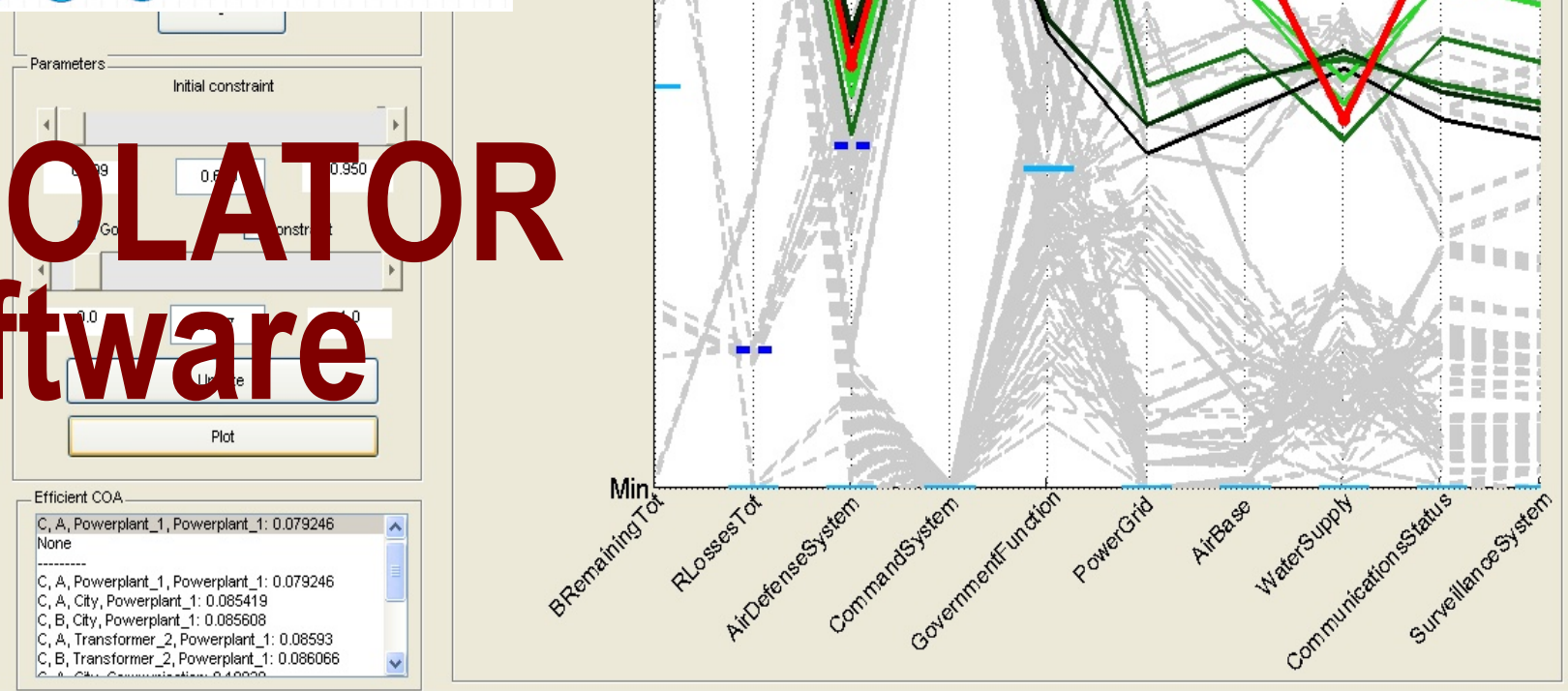
development of probability elicitation methods



multi-objective simulation-optimization
flight and maintenance scheduling



EBOLATOR software



selected publications

Mattila V. and Virtanen K.: Ranking and selection for multiple performance measures using incomplete preference information, *EJOR*, 2015
Mattila V. and Virtanen K.: Maintenance scheduling of a fleet of fighter aircraft through multi-objective simulation-optimization, *Simulation*, 2014
Mattila V., Virtanen K., and Hämäläinen R.P.: Simulated annealing algorithm for noisy multiobjective optimization, *J.Mult.-Crit.Dec.Analysis.*, 2013
Pousi J., Poropudas J., and Virtanen K.: Simulation metamodeling with Bayesian networks, *Journal of Simulation*, 2013
Poropudas J. and Virtanen K.: Simulation metamodeling with dynamic Bayesian networks, *EJOR*, 2011
Poropudas J. and Virtanen K.: Game theoretic validation and analysis of air combat simulation models, *IEEE Syst.Man Cybernetics*, 2010
Mattila V., Virtanen K., and Raivio T.: Improving maintenance decision-making in the Finnish Air Force through simulation, *Interfaces*, 2008
Karelahti J., Virtanen K., and Öström J.: Automated generation of realistic near-optimal aircraft trajectories, *J.Guid.Cont.Dyn.*, 2008
Virtanen K., Hämäläinen R.P., and Mattila V.: Team optimal signaling strategies in air combat, *IEEE Syst.Man Cybernetics*, 2006
Virtanen K., Raivio T., and Hämäläinen R.P.: Modeling pilot's sequential maneuvering decisions by a multistage influence diagram, *J.Guid.Cont.Dyn.*, 2004
Raivio T. and Ehtamo H.: Discretization, nonlinear and bilevel programming in pursuit-evasion games, *Game Theor.Appl.*, 2002
Virtanen K., Raivio T., and Hämäläinen R.P.: Decision theoretical approach to pilot simulation, *Journal of Aircraft*, 1999
Virtanen K., Ehtamo H., Raivio T., and Hämäläinen R.P.: VIATO - visual interactive aircraft trajectory optimization, *IEEE Syst.Man Cybernetics*, 1999
Raivio T., Ehtamo H., and Hämäläinen R.P.: Aircraft trajectory optimization using nonlinear programming, *IFIP Syst.Model. Optimization.*, 1996