Summary of D5 report (Dymkou)

In D5 report we have presented a method for using a Integer Linear Program (ILP) formulation to find the optimal solution to multiple-task assignment problem where the tasks are coupled by timing and task order constraints. Namely we are extend the proposed approach presented in D4 report for more complicated class of assignment problems with timing constraints. This formulation allows variation of UAVs flight paths to guarantee that timing constraints are satisfied, and directly incorporates the varying task completion times into the optimization. This is a promising formulation, which allows a true optimal solution for a vary challenging problem. Solution results were presented in sections 2.2.3 -2.2.7 (pp. 238-261) for several specific assignment problems with timing constraints.

Also we have presented an alternative problem formulation in dynamical form (see formula (3.21)-(3.25) page 270) with further reduction to static formulation(see (3.43)-(3.47) page 277) in order to apply constructive approach theory to find optimal or suboptimal solution. Scaling issues will require further work before the method can be applied to large problems. Future work will simply the problem structure to reduce complexity and apply the method to task assignment problem in a detailed UAV simulation, including more realistic cost functions.