

# Allocation subproblems as part of larger optimisation problems - examples from practice

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We describe three problems that we have encountered, where an important part of the overall decision making is the allocation problem of assigning specific resources to activities. This decision is to be taken as part of a (much) bigger problem, involving timing decisions (scheduling), sequencing decisions and also other constraints on the overall decision. The problems are such that using the integer variables related to assignment make the overall problem computationally intractable. Ignoring them altogether results in infeasible solutions which are not easy to modify to ensure feasibility. Different strategies are tried in the various examples.

- University timetabling - bottleneck allocation resources planned separately and they are taken as inputs in a bigger schedule

- Railway platform allocation - global aggregate constraints often result in feasible resource allocation

- Rolling stock assignment - short time frame assignments as part of long time horizon optimisation