

TOWARDS NEURO-SYMBOLIC TRAIN PLANNING

Learning from previous situations and producing recognizable plans

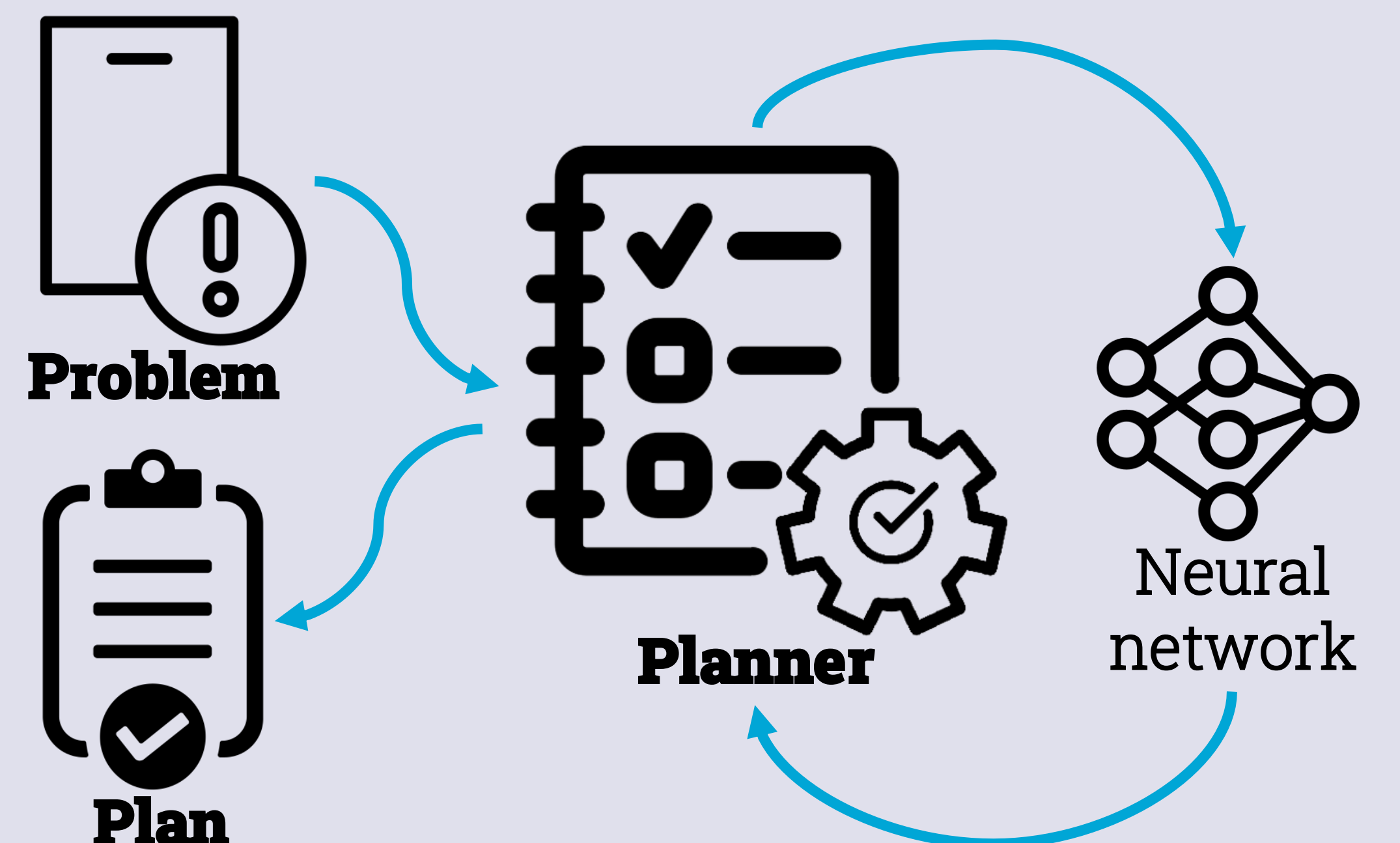
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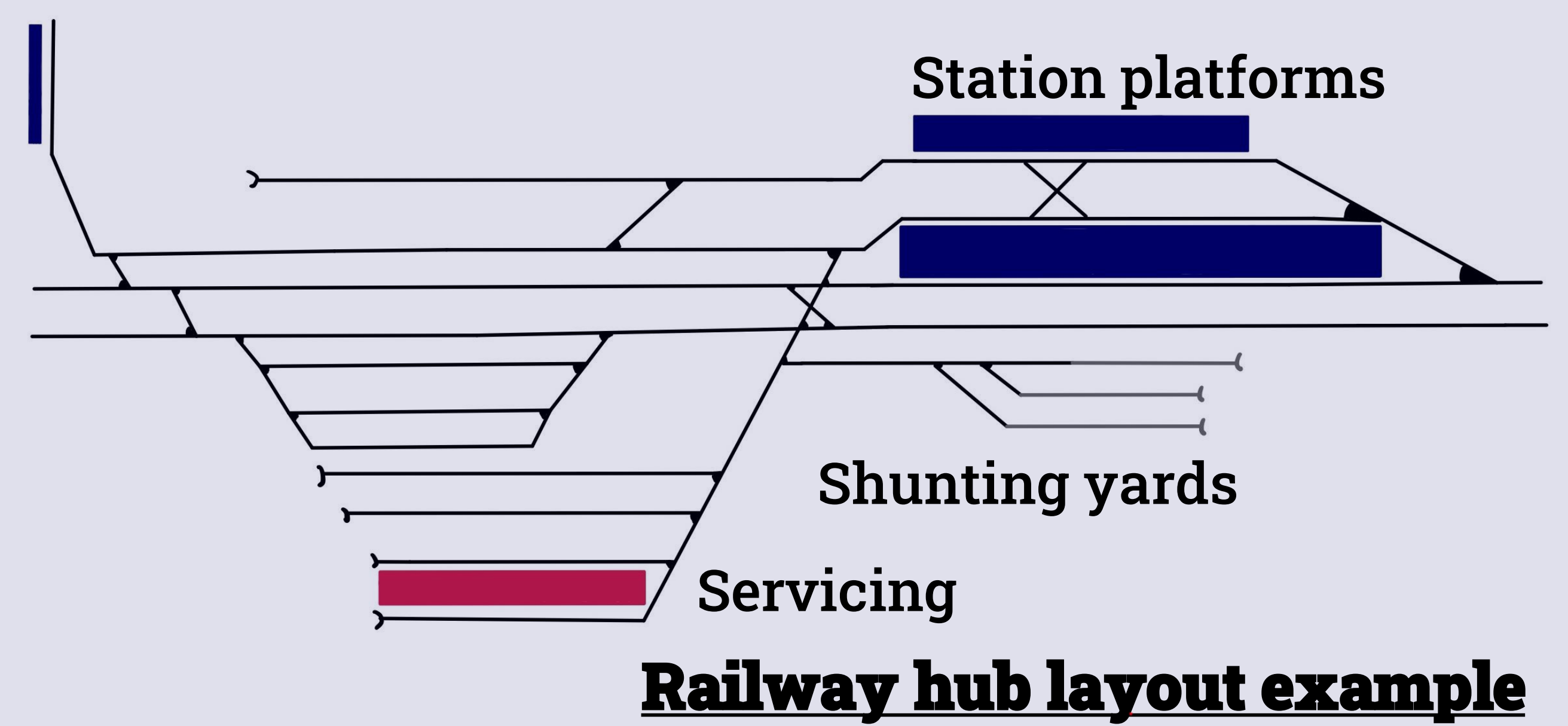
INTRODUCTION

- Best of both worlds: Combining neural components with traditional planning
- Help the planner: Exploring different components to learn



CONTEXT

- **Train planning:** given Dutch national timetable, create rolling stock planning surrounding railway hub
- Create a tool to aid human planners
- Future: Include also preferences of human planners

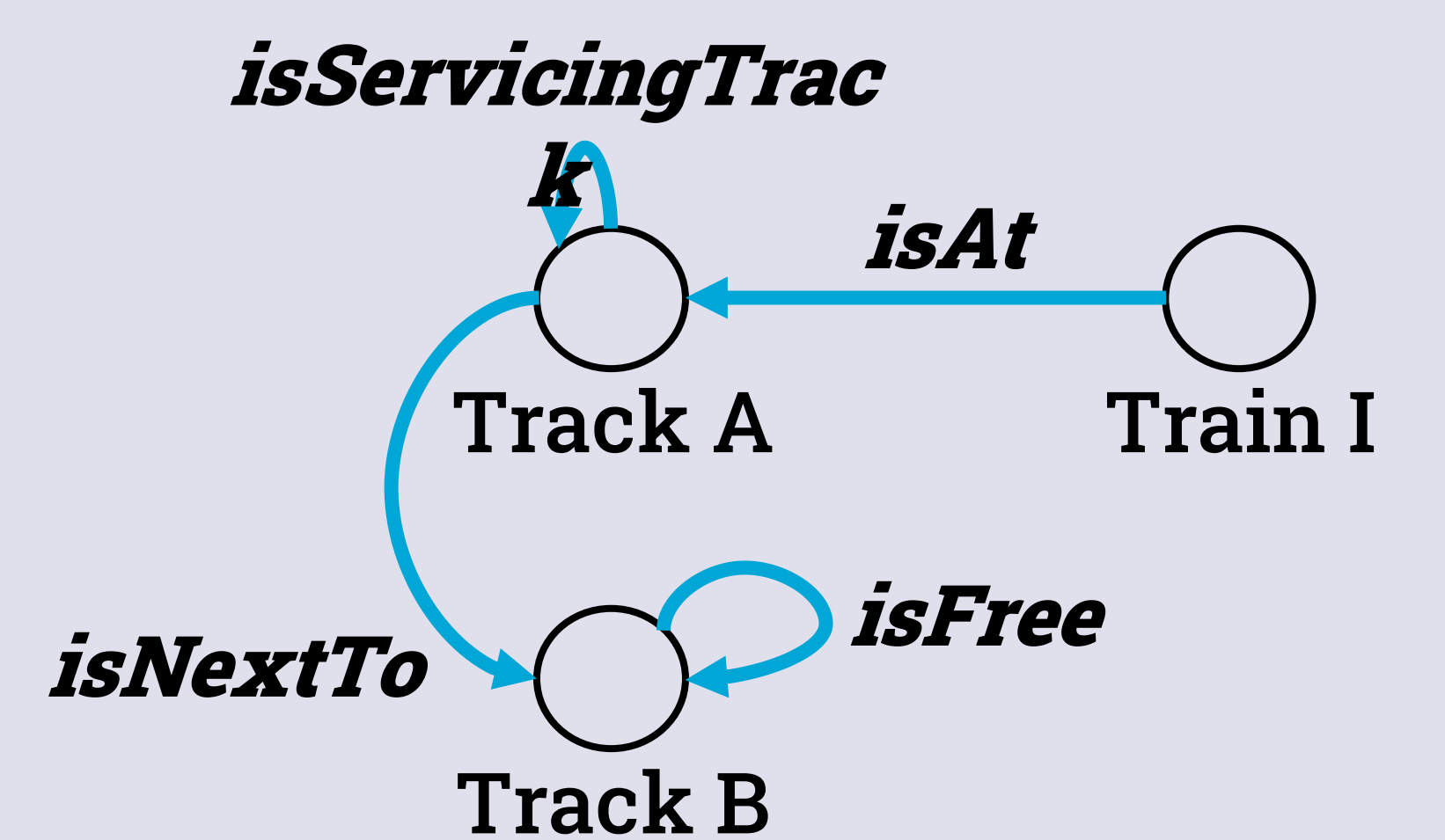


PLANNING

- **Given:** predicates P , goal $G \subseteq P$, initial state $I \subseteq P$, actions A with pre-conditions $pre_A \subseteq P$ and post-conditions $post_A \subseteq P$
- Plan is sequence of actions

LEARNING

- **Graph Neural Network:** state representation of objects/predicates
- **Heuristic:** what action to take in a particular state
- **Landmark:** necessary intermediate states to reach
 - Otherwise desirable states to decrease long-horizon
- Goal prioritizing or ordering: using backwards search to find
- Goal distance metric: A* like planning
- State description: focus on most important predicates



UNCERTAINTY

- Master thesis work by Reuben Gardos Reid
- Framework around existing simulator and deterministic planner
- Posterior distribution over planning space conditioned on observing no delay

