# Research Review. Historical developments in the field of AI planning and search

### STRIPS

During the late 1960s and early 1970s in SRI (Stanford Research Institute) a group of researchers worked on a robot Shakey (Nillson [1]), it was sponsored by ARPA and NASA. Project became a motivation and background for A\* search algorithm (Hart et al. [2]) and STRIPS (Fikes and Nilsson, [3]). For many years later, automatic planning research was focused on simple state-space problem formulation, and was frequently based on the representation framework and reasoning methods developed in the STRIPS system [4], also its representation language has been far more influential than its algorithmic approach [5]. Its language later evolved into ADL (Action Description Language, Pednault 1986) and was later replaced by PDDL (Problem Domain Description Language, [8]).

### Partial-order planning

Back in early 1970s plans were generally using ordered action sequences, but approach was found to be incomplete as it could not find solution to simple problems like Sussman anomaly [6]. New suggestion emerged – NOAH planner (Sacerdoti, 1975,1977) and INTERPLAN (Tate, 1977) – those were first partial-order planners. Partial-order planning dominated the next 20 years of research [5] but it was first formalized only 10 years later after it appeared, in a TWEAK system (Chapman [7]). Although partial-order planning approach was fast and complete, it suffered from complexity of node evaluations and proved to be computationally intensive.

### Graphplan

It is an algorithm for automated planning developed in 1997 [9]. Graphplan takes as input a planning problem expressed in STRIPS and produces, if one is possible, a sequence of operations for reaching a goal state [10]. It was orders of magnitude faster than the partial-order planners of the time [5]. Graphplan always returns a shortest possible partial-order plan, or states that no valid plan exists [9]. Eventually other algorithms followed (IPP [11], STAN [12]) but Graphplan is a breakpoint in between partial-order planning and graph planning algorithms.

### References

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