Planning Systems in early years

G.P.S., first General Problem Solver

G.P.S., **General Problem Solver**, was a computer program created in 1959 with the idea of having a universal problem solver machine. In the book with same name published in 1969, the authors Allen Newell, George W. Ernst, explain how any problem that can be expressed as a set of well-formed formulas (WFFs) or Horn clauses, and that constitute a directed graph with one or more sources and sinks, can be solved, in principle, by GPS. It was the first computer program to separate the knowledge of the problem and the strategy to solve it. G.P.S. was able to solve some problems, but failed on any real-world problem because the graph and the number of combinational explosion made the solution computationally untenable. [1]

Standardization of representation languages

Many different AI planning systems, like **STRIPS**, where created based on G.P.S. STRIPS was the first one to use a representation language with the same name, that became more important than the algorithm itself. Different representation languages were created based on modifications to STRIPS, being **PDDL** by Ghallab et al. the one that is still being used nowadays. [2] This allowed to have a common representation language for most of the problems.

Improving the problem solvers

Early planning systems constructed plans in a so-called **Total Order**. Starting with an empty plan, in each refinement step there is a commitment to a new action at a specific plan position. This position must be in a total order with respect to the plan's other actions. [3] To decompose the problem the usual approach used to solve the problems was computing a different subplan for each of the subgoals, and then adding those subplans together. This is called **Linear Planning**. Allen Brown found that these method couldn't solve some simple problems. A new method was introduced, **Partial Order**, that used conflict detection and the protection of achieved conditions from interference to solve some of the problems found in previous methods. NOAH and NONLIN systems created by Sacerdoti and Tate respectively were the first to use Partial Order. A method that dominated the planning research for the next 20 years. [2]

1. Wikipedia, General Problem Solver.
2. Artificial Intelligence, A Modern Approach.
3. Total-Order Planning.