scotte and Latombe, 1985) planned the machining and construction of mechanical parts, FORBIN was used for factory control, and NONLIN+ was used for naval logistics planning. We chose to present planning and scheduling as two separate problems; Cushing *et al.* (2007) show that this can lead to incompleteness on certain problems.

There is a long history of scheduling in aerospace. T-SCHED (Drabble, 1990) was used to schedule mission-command sequences for the UOSAT-II satellite. OPTIMUM-AIV (Aarup *et al.*, 1994) and PLAN-ERS1 (Fuchs *et al.*, 1990), both based on O-PLAN, were used for spacecraft assembly and observation planning, respectively, at the European Space Agency. SPIKE (Johnston and Adorf, 1992) was used for observation planning at NASA for the Hubble Space Telescope, while the Space Shuttle Ground Processing Scheduling System (Deale *et al.*, 1994) does job-shop scheduling of up to 16,000 worker-shifts. Remote Agent (Muscettola *et al.*, 1998) became the first autonomous planner–scheduler to control a spacecraft, when it flew onboard the Deep Space One probe in 1999. Space applications have driven the development of algorithms for resource allocation; see Laborie (2003) and Muscettola (2002). The literature on scheduling is presented in a classic survey article (Lawler *et al.*, 1993), a book (Pinedo, 2008), and an edited handbook (Blazewicz *et al.*, 2007).

The computational complexity of planning has been analyzed by several authors (Bylander, 1994; Ghallab *et al.*, 2004; Rintanen, 2016). There are two main tasks: **PlanSAT** is the question of whether there exists any plan that solves a planning problem. **Bounded PlanSAT** asks whether there is a solution of length k or less; this can be used to find an optimal plan. Both are decidable for classical planning (because the number of states is finite). But if we add function symbols to the language, then the number of states becomes infinite, and PlanSAT becomes only semidecidable. For propositionalized problems both are in the complexity class PSPACE, a class that is larger (and hence more difficult) than NP and refers to problems that can be solved by a deterministic Turing machine with a polynomial amount of space. These theoretical results are discouraging, but in practice, the problems we want to solve tend to be not so bad. The true advantage of the classical planning formalism is that it has facilitated the development of very accurate domain-independent heuristics; other approaches have not been as fruitful.

Readings in Planning (Allen *et al.*, 1990) is a comprehensive anthology of early work in the field. Weld (1994, 1999) provides two excellent surveys of planning algorithms of the 1990s. It is interesting to see the change in the five years between the two surveys: the first concentrates on partial-order planning, and the second introduces Graphplan and SATPLAN. *Automated Planning and Acting* (Ghallab *et al.*, 2016) is an excellent textbook on all aspects of the field. LaValle's text *Planning Algorithms* (2006) covers both classical and stochastic planning, with extensive coverage of robot motion planning.

Planning research has been central to AI since its inception, and papers on planning are a staple of mainstream AI journals and conferences. There are also specialized conferences such as the International Conference on Automated Planning and Scheduling and the International Workshop on Planning and Scheduling for Space.