The main topic of the work is the design and development of a plan-space planning system FAPE that integrates explicit time reasoning, resource reasoning with discrete resources and reservoirs and hierarchical decompositions. FAPE is the first planning system that accepts the language ANML, supporting most of its major features. We investigate different aspects of the integration, also proposing a new problem reformulation technique for the state-variable representation and discovering a transition of performance between sparse and minimal temporal networks. We further extend FAPE with acting capabilities and evaluate the runtime properties and benefits of its expressiveness. Finally, we present FAPE as a planning and acting system in real world experiments, where FAPE operates a PR2 robot.