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In this paper, we discuss the development of decision support systems for hierarchically structured planning approaches, such as commercially available advanced planning systems. We develop a framework to show how such a decision support system can be designed with the existing organization in mind, and how a decision process and corresponding software can be developed from this basis. Building on well-known hierarchical planning concepts, we include the typical anticipation mechanisms used in such systems to be able to decompose planning problems, both from the perspective of the planning problem and from the perspective of the organizational aspects involved. To exemplify and develop our framework, we use a case study of crude oil procurement planning in the refining industry. The results of the case study indicate an improved organizational embedding of the DSS, leading to significant savings in terms of planning efforts and procurement costs. In general, our framework aims to support the continuous improvement of advanced planning systems, increasing planning quality in complex supply chain settings.

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