



# Simio's Forward Looking Digital Twin

**Simio's Forward Looking Digital twin is powered by Simio RPS Edition. Simio RPS Edition adds a dynamic set of patented features to build and execute new models for Risk-based Planning and Scheduling (RPS). This edition provides full scheduling capabilities: custom tailor reports, graphs, and tables for use by schedulers. Reduce your risk and costs by analyzing your schedules in ways never before possible. OptQuest is included!**

Simio RPS Edition is a simulation tool for developing applications in Risk-based Planning and Scheduling (RPS). It is the dual use of a simulation model to generate both a detailed resource constrained deterministic schedule as well as a probability-based risk analysis of that schedule to account for variation in the system. Simio RPS Edition is used to generate schedules that minimize risks and reduce costs in the presence of uncertainty and will build upon the traditional APS system.

Traditional Advanced Planning and Scheduling (APS) has two gaps that Simio will cover. The first is simplifying assumptions. APS generates schedules by assuming there is no variation or uncertainty in the system (there are other simplifying assumptions but this one is most critical). By ignoring variation APS schedules are optimistic by nature - they promise more than can be delivered. The user of traditional APS has no way to assess or mitigate the underlying risk inherent in the schedule. The second gap is schedule obsolescence. A deterministic APS schedule quickly becomes obsolete as machines break, processes vary in time, material arrives late, etc. APS schedules which initially appear feasible become infeasible over time as variation degrades performance. Rescheduling with APS takes hours, so it is impractical to use in real time. Simio RPS Edition augments the deterministic schedule with risk measures that allow the decision maker to properly account for the underlying variation and uncertainty in the system, and do so in real time (e.g., minutes instead of hours).

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Simio RPS Edition uses a purpose-built simulation model to fully capture both the detailed constraints and variations in the system. This is a key advantage over traditional APS systems that rely on either a predefined or mathematical model of the system that cannot represent the critical constraints. The simulation model can be as simple or detailed as required, and may include complex processing and material handling constraints such as ovens, forklift trucks, conveyors, moving operators, etc., as well as complex work crews.

Simio RPS Edition provides a unique and patented approach to scheduling by using the custom-built simulation model in two ways. The first is to generate a detailed schedule/plan. Because the exact variability is at this point unknown, the model is executed in a purely deterministic mode; machines do not break, process times are always constant, materials arrive on time, etc. This is the optimistic view assumed by all scheduling systems and produces a deterministic plan/schedule. Once the schedule has been generated, Simio then replicates this same simulation model with variation added back into the system and performs a probabilistic analysis to estimate the underlying risks associated with the schedule. The risk measures generated by Simio include the probability of meeting user-defined targets, as well as expected, pessimistic, and optimistic schedule performance. This risk analysis is a patented feature of Simio and not found in traditional scheduling tools.

By providing up-front visibility into the inherent risk associated with a specific plan/schedule, Simio provides the necessary information to take early action in the operational plan to mitigate risks and reduce costs. Simio provides a realistic view of expected schedule performance. Specific alternatives such as overtime or expediting external material/components from suppliers can be compared in terms of their impact on both risks of meeting schedule targets, and costs of mitigating those risks, thereby providing a customer-satisfying operational strategy at a minimum cost.

Although Simio RPS Edition has several features specifically designed to support scheduling applications, it can also be used as a general-purpose simulation modeling tool. The same Simio simulation model that is used for scheduling can also be used in a traditional role to analyze and improve the design of the underlying production system by randomly generating orders over a long planning horizon. For example, the model could be used to evaluate the long-term impact on performance of capital equipment purchases, changes in process flows, or new product introductions. Hence the same simulation model can be used to both improve the facility design as well as provide the detailed model logic for planning/scheduling of day-to-day operations.

## Proof of Simio RPS successes...

*Simio RPS directly integrates with AVEVA Manufacturing Execution System to create an optimized plan for execution with automatic scheduling and re-scheduling and reflect the current load of the facility.*

Capital Region of Denmark  
Healthcare Scheduling

*Simio RPS has allowed John Deere to consider complex material requirements, equipment resource availability, due dates, and nine different sequencing constraints.*

John Deere Cast Iron Foundry  
Manufacturing Scheduling

*Simio RPS has allowed Shell to generate schedules that meet their complex constraints, and to assess the risk associated with the schedules.*

Shell Gulf of Mexico  
Logistics Scheduling

*Simio RPS helps BAE Systems meet production deadlines and is now used for a variety of forecasting and scheduling challenges including decreasing overtime, managing equipment reliability issues, developing training goals, writing proposals, and evaluating capital investments.*

BAE Systems  
Manufacturing  
Scheduling



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Updated: 2020-04-14