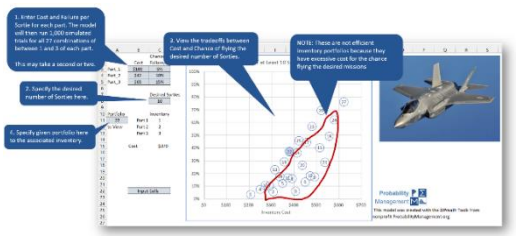
A Chance-Informed Perspective of Deployment Spares*

The spare parts required for deployment depend on the uncertainty of when components will fail. It is best to think about this from a Chance-Informed perspective in which we compare the cost of the parts inventoried with the chance of flying the desired number of missions. Each dot in the graph on the right represents a different potential inventory portfolio of parts, with the horizontal axis displaying the cost of that inventory and the vertical axis displaying the chance of flying at least 10 missions before inventory of some part is exhausted.

The portfolios in the red region are not efficient because for each one, there is a portfolio to its Northwest, that both costs less and provides a higher chance of completing the desired missions.

The simple interactive model described here is designed to help you think about the problem by focusing on a single aircraft and three parts. The technique of probability management, which represents uncertainty as auditable data offers a new approach to scaling up models like this for operational use.

In this model each of the three parts has a cost, and a chance of failing during each sortie, which does not vary as more sorties are flown. In reality, one would need to model an entire squadron, parts that depended on both sorties and flight hours, and also aged over time.



Open the model and follow the instructions on the About Tab. See how the portfolio choices change as the costs and failure probabilities of the parts are changed. Note that this model uses the SIPmath Standard from nonprofit ProbabilityManagement.org to run 250 simulation trials using the Data Table function for each of 27 inventory portfolios. Some changes may take a second or two to reflect in the graph.

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Model and Documentation at ProbabilityManagement.org and the Military Operations Research Society

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