

**Integrating Performance and Schedule Analysis
with Acquisition Costing for Ground-Based Radars**
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Abstract:

DoD cost organizations are increasingly interested in developing tools that integrate system engineering (sensor performance) and schedule analysis with acquisition cost estimating methodologies. Tools that integrate engineering and schedule analysis with cost can be applied early in the acquisition process to: 1) support the identification of affordable designs (pre and post Milestone A), 2) identify realistic program schedules and funding profiles and 3) provide program managers better answers of how changes in performance, design and schedule affect cost. Technomics and Georgia Tech Research Institute (GTRI) have developed a set of tools (cost models, performance models and schedule models) for phased array and planar array ground-based radars for the Air Force Cost Analysis Agency (AFCAA). When these models are linked together they can support the types of cost versus capability trade analyses and cost estimating now required early in the life cycle process.

Cost methodologies that can be linked to systems engineering (performance analysis) can support trade analyses that help identify affordable system designs by trading-off requirements and system costs. Mission requirements such as probability of detection, probability of false alarm, target cross section, along with key design parameters are used to calculate the range of the sensor (e.g. radar). By inputting various combinations of design parameters along with mission requirements into the radar range equation, radar performance can be calculated. These same design parameters can be input into cost equations that yield hardware, non-recurring engineering (NRE) and support cost estimates for radar development programs. A cost effective design or an affordable design can be synthesized by inputting various sets of design parameters that meet top-level mission requirements (e.g. range) and choosing the design set with minimum or affordable cost.

The designs that are synthesized in the radar performance analysis (that meet program cost objectives) can be tied to schedule estimating models. Schedule estimating relationships (SERs) have been developed for ground-based radars that estimate the length of development, the level of expenditures (i.e. funding profile) and major schedule milestones based on technical characteristics of the radar design and type of radar program. These SERs not only estimate schedules and their characteristics, but also as a by-product produce a second cost estimate of the program. The presentation will include an overview of the products developed and a live demonstration of the engineering design synthesis (a cost versus capability analysis) and schedule estimation process for a hypothetical set of radar design configurations.