LETTER TO THE EDITOR

The fall 2002 issue of the *Acquisition Review Quarterly* (*ARQ*) journal contained some very interesting articles. The one, which got most of my attention, is entitled "Using Options to Manage Dynamic Uncertainty in Acquisition Projects."

The authors make the following statement in their article. "But the processes, methods and tools for developing flexible strategic plans and adapting to changes have not been operationalized adequately to be applied to management of dynamic project uncertainty. Project planning, risk management, and other management decision-making theories also do not provide operational processes to proactively use flexibility to manage project uncertainty (Ceylan & Ford, 2002, p. 248).

Although I disagree with this statement, I tried to ascertain if there was really anything new in this presentation. However, I could not find anything new as the article was really a description of what systems engineering should do if properly implemented. Broadly defined, system engineering is not only flexible, but "the effective application of scientific and engineering efforts to transform an operational need into a defined system configuration through the top-down iterative process of requirements definition, functional analysis, synthesis, optimization, design, test, and evaluation" *(*Blanchard, 1991, p. 12).

In addition, system engineering can be broken down into four major steps as follows: A *top-down* approach, a *life-cycle* orientation, a better and complete effort regarding initial *identification of system requirements*, and an *interdisciplinary* approach through design and development (Blanchard, 1991, p. 13).

Starting with system design, any number of design proposals or alternatives may be considered, with several contracts competing for the most promising. Ample clauses protect the government's right to design data regardless of the termination of some of the design efforts. This data may contain alternatives for components which may result in development contracts to reduce risk.

One of the elements of the design evaluation process is the evaluation of risk and uncertainty. These terms tend to be used interchangeably, but "*risk* actually implies the availability of discrete data in the form of a probability distribution around a certain parameter. *Uncertainty* implies a situation that may be probabilistic in nature, but one that is not supported by discrete data*"* (Blanchard, 1991, p. 51). The aspects of risk and uncertainty must be incorporated in the part of systems engineering called the Program Risk Management Plan, which is a part of the overall Systems Engineering Management Plan.

The use of options in the acquisition field has been around a long time. Most research and development contracts provide for options to change the direction of the effort, increase funding, and extend completion, as well as a unilateral right of the government to terminate the effort.

As noted in the *ARQ* article, uncertainty is difficult to program, however it has been a recognized part of program management for many decades and highlighted during the 1970s by Dr. John S. Foster Jr., (then Director of Defense Research and Engineering, Department of Defense), who called the problem "unk-unks" or "unknown unknowns." Each program manager on the Defense Acquisition Review Council (DSARC) at that time was questioned about unknown-unknowns, with much discussion of statistical probability theory, financial provisions, and alternatives. However the best of theory could not provide for example the aftermath of September 11, 2001, the impact of action in Iraq, the oil problems generated by strikes in Venezuela, the Stevedore strike in California. It is however the major job of a program manager to manage uncertainty and that is the real test of his/her management skills. The flexibility and tools provided by system engineering which include evaluation of uncertainties, a comprehensive Work Break Down Structure (WBS), and a constant program review process provides the vehicle for minimizing the difficulties caused by uncertainty.

Most Program Managers hold a *rainy day* fund, and it would be great to hedge against all bets, but the best of option theory will not forecast or protect against uncertainties such as labor unrest, subcontractor bankruptcy, acts of God (Earthquakes, hurricanes, floods, and fire). Is there a statistical probability that one or more of these will occur and impact an ongoing system acquisition? Yes there is and it is calculable, but the probability is so large most PMs do not insure their programs against it, any more than the government provides knowing contingency funding or funds overruns before they occur. *Options* which are defined in the Merriam-Webster's Collegiate® Dictionary (1994) as the power or right to choose: freedom of choice, a privilege of demanding fulfillment of a contract on any day within a specified time, and a contract conveying a right to buy or sell designated securities, commodities, or property interest at a specified price during a stipulated period (p. 817), as follows and are expensive insurance, as any right under a contract costs money.

Also noted in the article, the use of options is not new. They may be contractual, part of the program plan or in the head of the program manager, and it is doubtful if any theory can aide in the management of uncertainty, given the dynamics of the environment in which we develop new systems, whether in industry or in government. The major players in system acquisition are: the contractor and staff, the program manager and staff, the Service of the program manager and staff, the Office of the Secretary of Defense and staff, the Congressional Committees and their staffs, and various subcontractors. With that much uncertainty created with that many participants, the following is considered appropriate "Consider now a participant in a social exchange economy…. Each participant attempts to maximize a function of which he does mot control all variables…. One would be mistaken to believe that [this kind of problem] can be obviated by a mere recourse to the devices of the theory of probability. Every participant

can determine the variables which describe his own actions but not those of others. Nevertheless those 'alien' variables cannot, from his point of view, be described by statistical assumption" (Von Neumann & Morgenstern, 1994, pp. 9-11).

There are several classic programs where options were used quite successfully, but in different environments, different priorities, different funding structure, different timing, different political environment, different technologies, and different complexities. The F111B, Polaris/Poseidon, the nuclear submarine program; the Joint Aircraft Engine development, the development of solar energy; and from long ago the Manhattan project are examples. Trying to model uncertainty is like trying to model the movement of the stern of an aircraft carrier in heavy seas.

In closing, as a famous program manager said to other junior PMs: "*You have got to keep your options open.*"

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