

Improving proposal evaluation process with the help of vendor performance feedback and stochastic optimal control

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ABSTRACT

Proposal evaluation process involves determining the best value in a dynamic environment with massive uncertainty. Vendor performance analysis can provide some feedback in the long run. A smart evaluation model should work as a control system where feedback is used to correct and continuously improve the model. If the information, which the control system must use, is uncertain or if the dynamic system is forced by random disturbances, it may not be possible to optimize the best value selection process with certainty. Stochastic optimal control helps in the long run to maximize the best value. The optimal control system recognizes the random behavior of the system and attempts to optimize the process on the average rather than with assured precision.

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INTRODUCTION

The ability to easily identify the "best qualified" firm or proposal is a very complex process. It involves selection of right criteria, metrics, subject matter experts as evaluators and an evaluation process that just suits the Request For Proposal. By ensuring the selection of the most qualified firms, the practitioners can anticipate that they will realize cost savings by having projects completed on time and within budget.

Selection and application of right criteria, metrics, and evaluators are some of the biggest challenges in this process. The presence of a dynamic environment and massive uncertainty make the process even more complex. There is nothing called best evaluation. The evaluation can be good but it can always be better. Vendor performance feedback forms the most important benchmark for evaluating how good the evaluation process worked. Vendor performance feedback provides 'learning opportunities' for the evaluation process of future evaluations. An intelligent software and database driven evaluation process continuously improves the process, criteria selection, cost models, risk analysis and evaluator selection and performance issues. The goal of an intelligent self-correcting evaluation process is to provide over a long-term most optimal vendor

selection process given the uncertainty and dynamic nature of the real world.

Evaluation criteria, the evaluators and the proposal evaluation process (cost models, upset levels, past performance models and more) can be improved over time with the help of vendor performance monitoring.

Stochastic Optimal Control helps by allowing continuous process improvement in an uncertain environment. A stochastic optimal control system really performs two functions. It not only controls the dynamic system, it also estimates the system's dynamic state in order to provide the best "feedback" information for the closed-loop control. All control systems are intended to optimize some criteria, whether or not the criteria are stated explicitly, and there is some degree of uncertainty in any control system implementation.

CONTROLLABLE DYNAMIC SYSTEMS

Stochastic optimal control can be applied to a dynamic system that consists of a physical, chemical, economic, or other dynamic process and its observation. In order to design the control logic, a mathematical model of the dynamic system must be defined. The model is a mathematical approximation of the actual system.

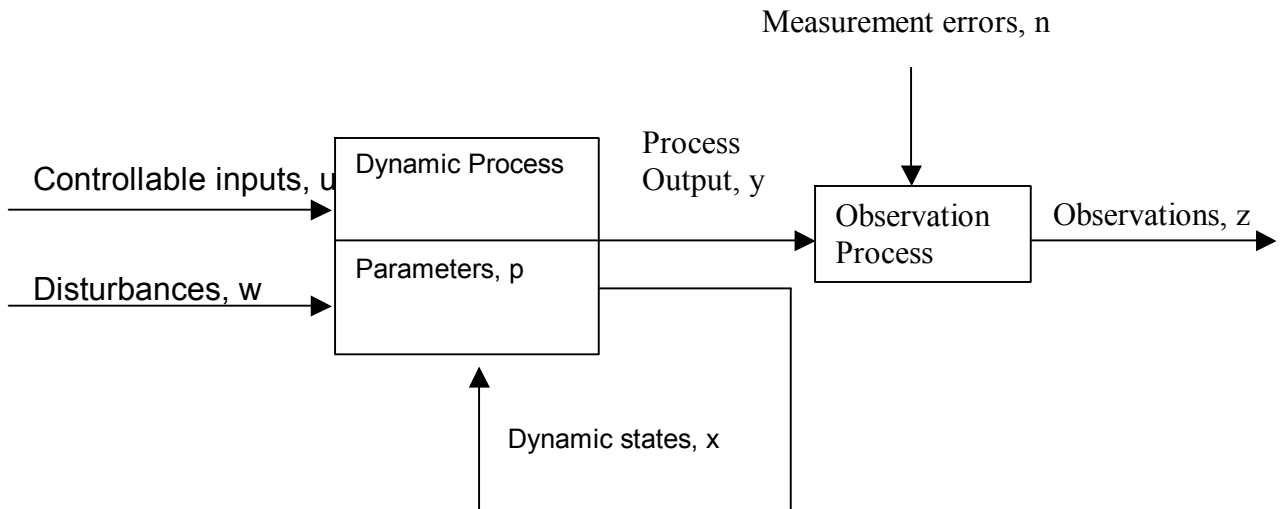


FIGURE 1 Elements of a dynamic system

Parameters p scales the process's response to inputs and to its own motions, either in the dynamic process, the observation, or both. The process inputs that can be controlled are contained in controllable inputs u , while those that are beyond control are contained in disturbances w . The state x represents the dynamic condition of the process, including its fundamental response to inputs and initial conditions. The process structure is such that x feeds back into the system through natural dynamic paths. This feedback can modify process response in several ways by shifting the steady-state characteristics, causing oscillations, stabilizing or destabilizing the process.

The output y from the process cannot be measured exactly. So the observation z , is some combination of the output y , and measurement error, n .

If the dynamic process is subject to control inputs without regard to measured (or estimated) value of the state, the control is called open-loop control, as there is no information path or control loop from x to u . A closed-loop control results with the addition of the feedback information from x to u .

Open-loop optimal control can be applied only if the dynamic system can be adequately controlled. The closed-loop control including stochastic control requires adequate observability as well.

In most cases of proposal evaluation, the dynamic process is only partially controllable and observable. Limited resources prevent implementation of complete control and observation.

The dynamic processes are normally continuous functions of time. They are best modeled with the help of differential equations. These are called continuous time systems. Numerical approximations with the help of computers provide solutions.

In digital computer applications, control settings are calculated and measured at discrete and often periodic instances of time. These processes are characterized as discrete-time results.

CLASSIFICATION OF DYNAMIC MODELS

For either continuous-time or discrete-time models, the dynamic models can be classified as shown in Figure 2. If the dynamic coefficients, or parameters, p , are changing rapidly in time, in comparison with the time scale of motion, the dynamic model is time varying. If the coefficients are relatively constant, a time-invariant model is the result. If doubling the initial condition or input doubles or multiplies the corresponding response by a linear factor, then the model is linear. Otherwise the model is non-linear.

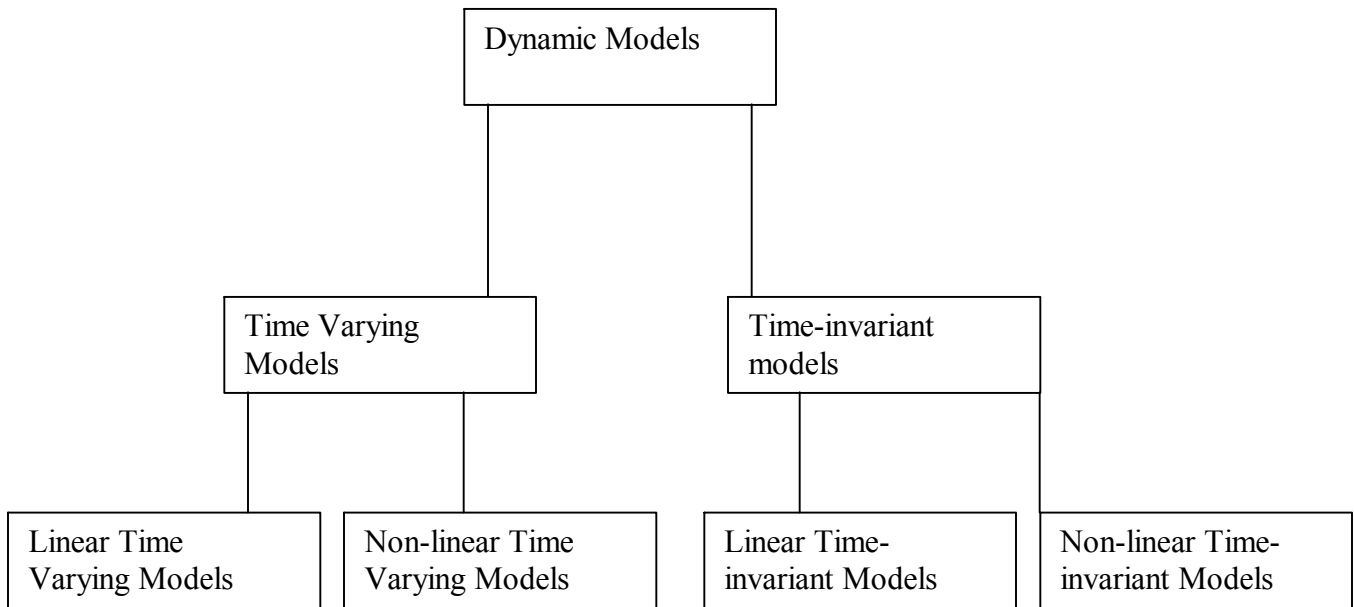


Figure 2 : Classification of Dynamic Models

THE DYNAMIC MODEL OF PROPOSAL EVALUATION

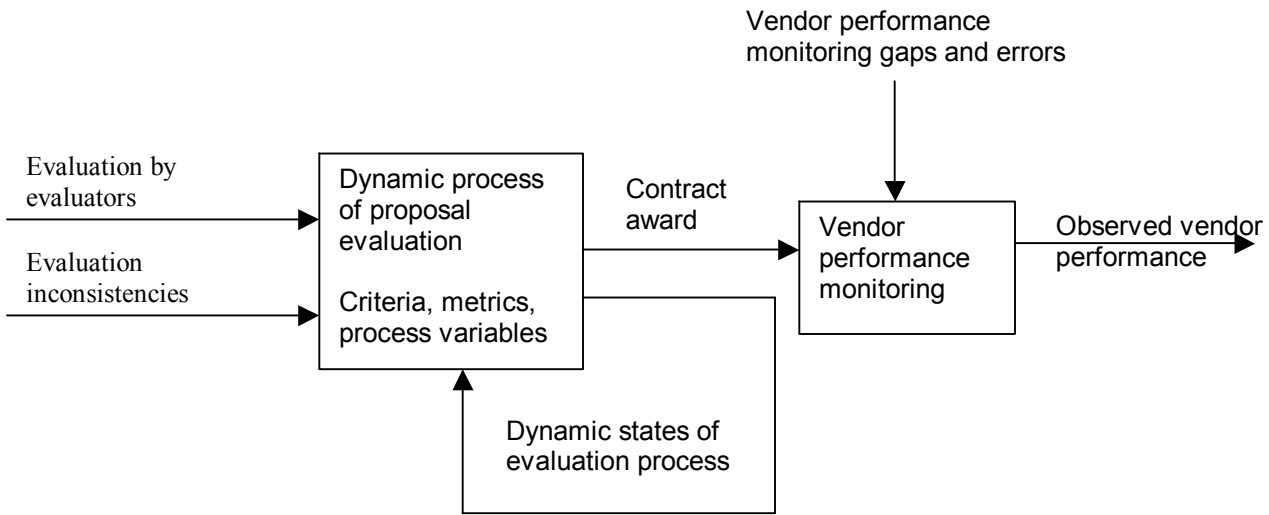


Figure 3 : RFP evaluation model

Evaluation by evaluators and possible evaluation inconsistencies are input to the Dynamic process of proposal evaluation. Feedback control of the dynamic state of the evaluation process can improve the process during the evaluation cycle. The dynamic states can be modeled with the help of evaluator progress of evaluation, amounts and quality of comments written by the evaluators, evaluator feedback on appropriateness of the criteria, appropriateness of the cost models and upset levels.

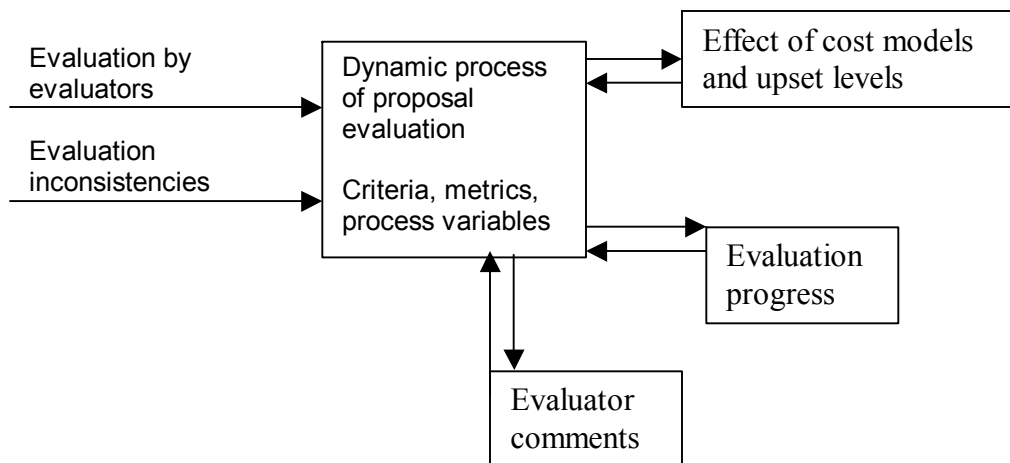


Figure 4: Improving an ongoing evaluation model with dynamic feedbacks

The evaluation progress is available in a web-based database driven evaluation software. The comments and quality of evaluation can also be determined in a similar tool. The biggest advantage of such a tool is in the ability of the buyer or contract administrator in changing cost models, upset levels on specific criteria and other process variables. This involves fine-tuning an ongoing evaluation process.

Evaluator	Proposal	Initial				Cost Criteria	Oral	Risk	DBE Criteria	Update Link
		General Criteria	Personnel Criteria	Past Performance Criteria	Other Criteria					
John	South Walton Fire District	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	N/A	update
Edwin	South Walton Fire District	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	N/A	update
Chris	South Walton Fire District	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	N/A	update
John	Walton County Sheriffs Office	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	N/A	update
Edwin	Walton County Sheriffs Office	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	N/A	update
Chris	Walton County Sheriffs Office	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	N/A	update

Figure 5 : Evaluator Task Assignment

Evaluator task assignments allow assigning specific tasks to evaluators. In software driven processes, all evaluators need not perform the same evaluations. Subject matter experts can be assigned to evaluate what they do best. For example technical subject matter experts can evaluate technical criteria while past performance can be evaluated by purchasing agency officials. Evaluator task assignment can even allow certain evaluators evaluate certain criteria of some specific proposals. The evaluator task assignment process works together with evaluation progress monitoring facility in such a tool.

The evaluation progress monitoring utility can manifest evaluator activities with regard to the evaluation project. The utility can show which evaluators started evaluation of which criteria of which proposal. It can also show which evaluators have completed and which parts of the whole evaluation process are in progress. This becomes an invaluable tool for managing the project. Before an evaluation caucus meeting, such a report can manifest if the evaluation will be completed before the meeting. It can also help in understanding the need for additional resource requirements for the evaluation.

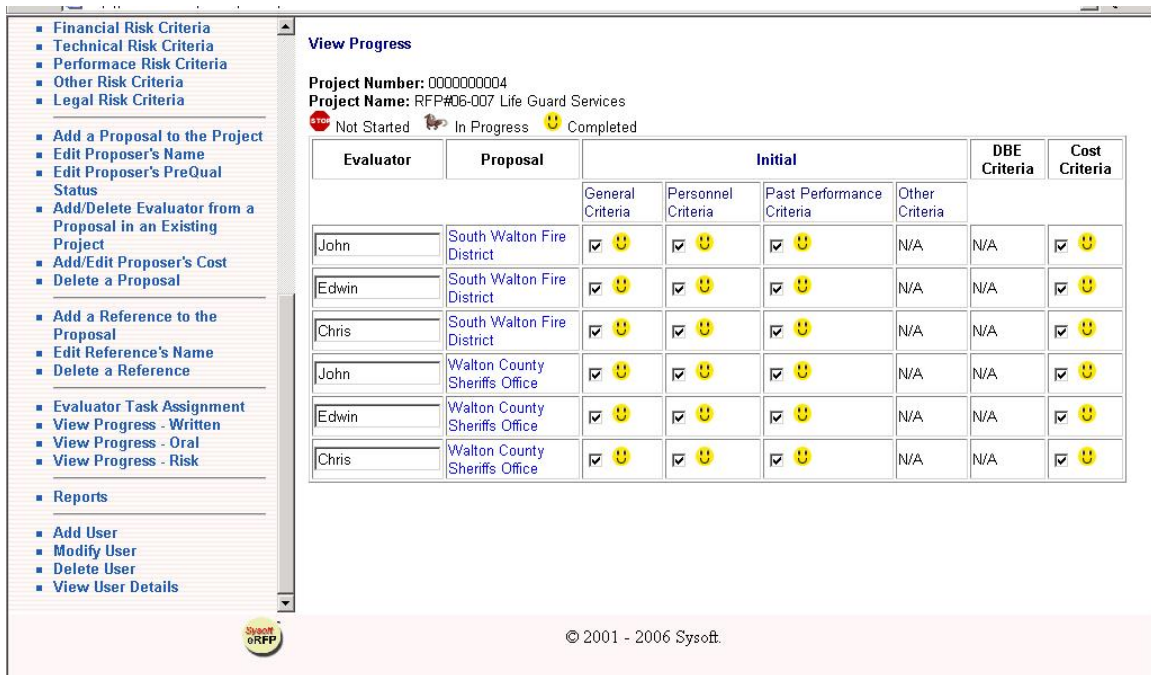


Figure 6: Monitoring evaluation progress

Based on the evaluation task assignments, the 'view progress' utility can show the status of evaluation. The project administrator can understand which part of the evaluation is completed in a hurry.

The other feedback variable is the evaluator comments. Software driven systems can also track the amount of comments evaluators are using. An evaluation normally attains a higher quality with mandatory requirements of evaluator comments. These evaluator comments can be reviewed in the caucus meeting if the report generator can stack all relevant comments of all evaluators per criteria.

Agencies using database driven software tools for RFP evaluation or vendor selection process report that evaluator comments improves the evaluation immensely. In such a system, it is easy to put comments, relate to the evaluation metric assigned and make changes to comments any time if needed till the evaluation deadline is reached.

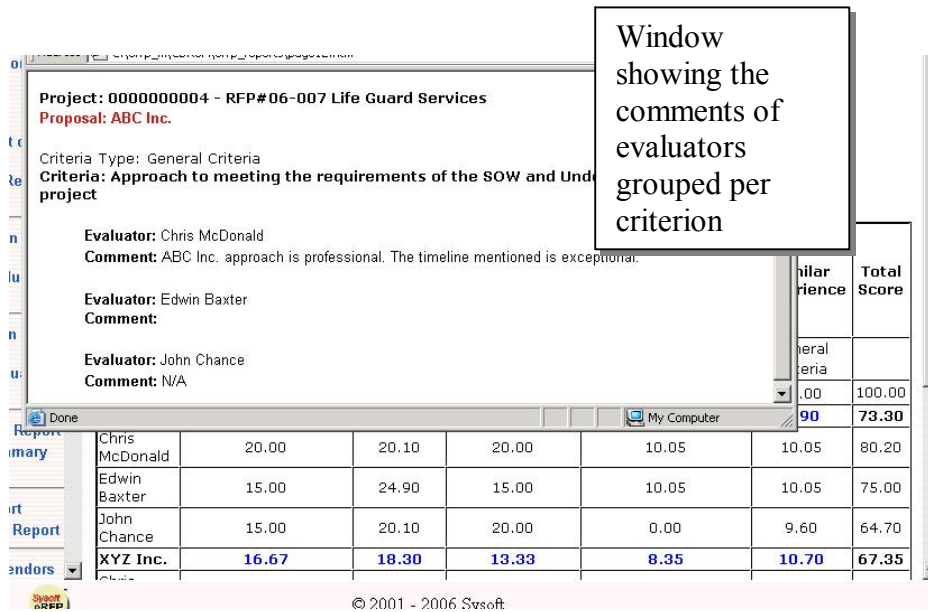
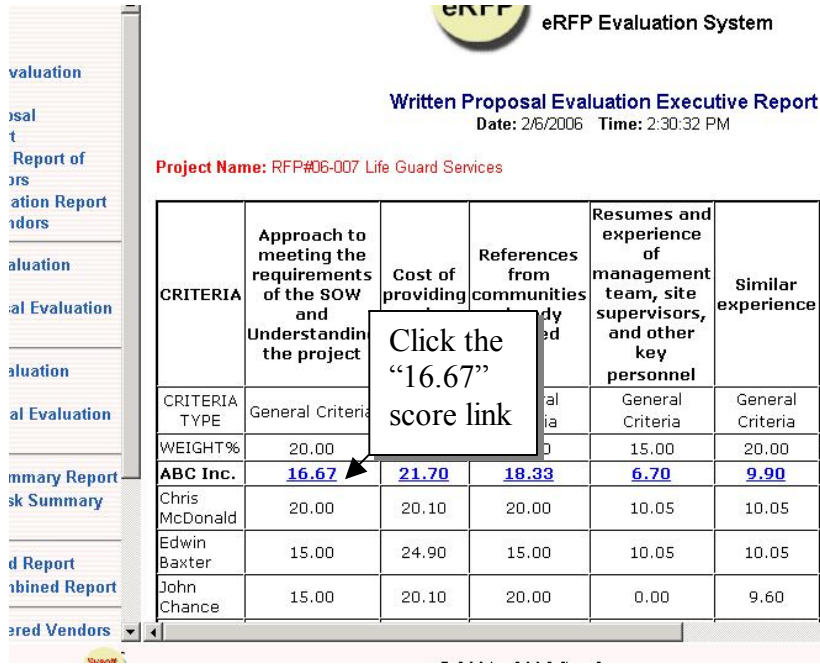


Figure 7: Tracking evaluator comments

The software driven process can also help in adopting to various cost models. The ability to change cost models and generate reports provides an excellent

facility to fine tune the process. Even if the agency is determined to use a specific cost model, it is always beneficial to understand the impact in an evaluation project when other cost models are used.

Typical cost models used in RFP evaluation processes are:

Competitive Range Analysis

This model disregards the cost related weights in computing overall score for initial criteria

Least Cost Evaluation

This model eliminates proposals that do not meet criteria based on upset levels and then ranks the proposals based on cost. Lower the cost higher is the rank

Greatest Benefit for Dollar Cost

In this model the initial overall score is calculated first, based on all except cost. Then the overall score is divided by the cost of each proposal. This value for each proposal is multiplied by a cost range (difference between highest cost and lowest cost). Then the proposals are ranked by Benefit for Dollar Cost.

Cost as an Evaluation Category

In this model the cost is taken as a factor in the scoring scheme.

For example: The lowest cost proposal gets all of 4 points. If the next proposal is 20% higher in cost than the lowest cost proposal then that proposal receives 20% less points i.e. 3.2 and so on. Finally the cost score is considered in calculating the overall score.

Cost as a Subjective Criteria

In this model the cost criteria is treated as any other criteria where evaluators can assign scores per criteria. The overall score considers cost as any other criteria with appropriate weights. System does not compute the cost score as in Cost as and Evaluation Category instead uses evaluator scores as the basis.

VENDOR PERFORMANCE MONITORING

Vendor performance monitoring can provide adequate snapshot observations to stochastically improve future evaluation processes. It is not deterministic in the sense the vendor performance cannot linearly correlate to future improvements of the evaluation process. However, if the Vendor performance monitoring gaps and errors are modeled and understood, the evaluation process can be improved with the help of vendor performance monitoring process.

Vendor performance can be related to:

- Initial performance
- Ongoing performance

- Wrap up performance

The monitoring can be performed by

- Vendor itself (self-assessment)
- Contract Administrator
- End users affected by the performance of the vendor
- Third party consultants

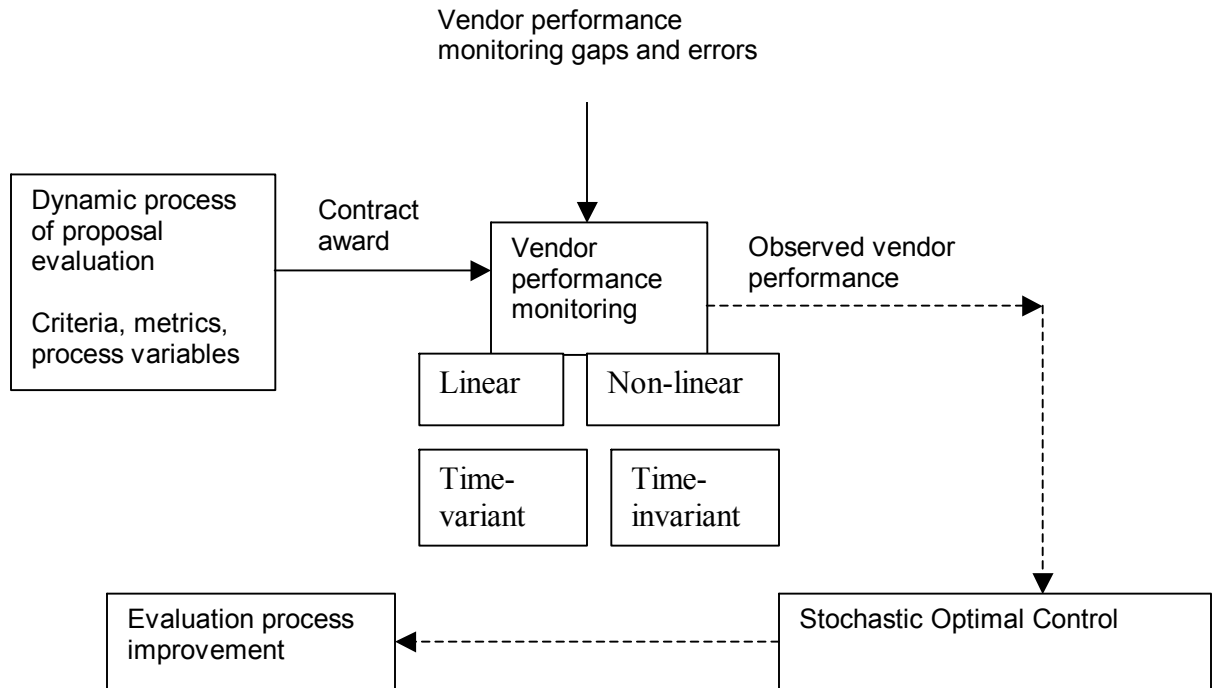


Figure 8 : Evaluation process improvement with feedback vendor performance monitoring

The process of stochastic optimal control attempts to optimize the process on the average rather than with assured precision. It recognizes uncertainties associated with a typical proposal evaluation process and vendor performance monitoring process.

The main benefit from the stochastic optimal control systems is that they provide a systematic way of describing feasible solutions that can be expanded or simplified to match the control design of the evaluation process and its practical constraints. The theory provides the equations and algorithms that generate answers once the system model and performance indices are good and what numerical values are satisfactory. It must rely on the user's good judgment to

specify models and objectives properly.

The challenge in applying stochastic optimal control methods is to match understanding of the methodology, knowledge of the system to be controlled, and reasonable expectations of optimal system performance. A database driven software tool provides the necessary ingredients needed to perform the optimization process.

CONCLUSIONS

The stochastic optimal control uses the vendor performance monitoring data to optimize the proposal evaluation process on the average rather than with assured precision. The dynamic feedback control helps in improving the evaluation process while the evaluation is ongoing. The feedback elements can be evaluator progress of evaluation, amounts and quality of comments written by the evaluators, evaluator feedback on appropriateness of the criteria, appropriateness of the cost models, upset levels and other process variations.

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