

MANAGEMENT CONTROL SYSTEMS THEORY AND C/SCSC¹

INTRODUCTION

Learning the specialized language and concepts of performance measurement is a significant challenge. Remembering the meanings of PMB, BAC, CBB, MR, BCWS, BCWP, ACWP, and a host of other acronyms, can be quite challenging by itself. When this unique jargon is combined with the task of learning concepts such as earned value and baseline maintenance, it is little wonder why many struggle to get out of performance measurement as soon as possible, and define C/SCSC as “chicken-something squared.”

Management Control Systems (MCS) theory is a useful integrative tool for organizing, explaining, and understanding the jargon and concepts of performance measurement. MCS theory can help make sense of the criteria by providing a way of organizing and remembering the criteria and the related jargon and concepts. A good place to start in understanding the relationship between the criteria and MCS theory is with the stated objective of the criteria:

To provide an adequate basis for responsible decision-making by both contractor management and DoD Components, contractors' internal management control systems must provide data which (a) indicate work progress, (b) properly relate cost, schedule and technical accomplishment, (c) are valid, timely and auditable, and (d) supply DoD managers with information at practicable level of summarization (DoDI 7000.2).

The phrases “responsible decision-making” and “management control systems” are important. The criteria are intended to foster responsible decision making by setting minimally adequate standards for the contractor’s MCS. But just what is responsible decision-making, what is the relationship with the criteria, and what is MCS? This paper answers these questions. The intent is to build a conceptual framework useful for explaining and understanding the criteria.

RESPONSIBLE DECISION-MAKING AND INFORMATION QUALITY

A responsible decision is one that is based on information. A responsible decision-maker will use information. Information, however, is different from data. Information is data that is useful for decision making. Cost and schedule performance data provided on the Cost Performance Report (CPR) or Cost/Schedule Status Report (C/SSR) must thus be aggregated, filtered, analyzed, or otherwise tailored to the decision problem and to the decision-maker to transform it into information.

Before data are converted into information and used in decision-making, the responsible decision-maker should (1) have some role in specifying the content, format and frequency of the information and (2) evaluate the quality of the information provided. Both of these tasks are addressed in DoD instructions. DoDI 7000.10 addressed the information requirements by specifying the format, timing and content of the CPR and C/SSR. A decision-maker can tailor these reports to his/her specific decision problem by defining the desired level of detail in the reports and the specific formats needed. Discovering just the right level of detail, format, and timing is termed “information requirements analysis,” and is a major research area in management information systems and accounting. Sometimes the manager does not know what information he/she needs, requests too much data, and suffers more from an abundance of irrelevant data than from a lack of information—a phenomenon termed “information overload.”²

¹ Christensen, David S. 1989. “Management Control Systems Theory and C/SCSC.” National Estimator 8:29-34 (Fall).

² Ackoff. 1967. “Management Misinformation Systems.” Management Science.

The responsible decision-maker should be concerned about the quality of information provided by the contractor. Whenever the preparer of the data/information is different than the user, there is a potential for conflict of interest. For example, investors and creditors use a company’s financial statements to evaluate the investment or credit potential of a company. A company wants to attract investors and creditors and strives to present itself on its financial statements in the most attractive way possible. Similarly, the contractor prepares the CPR or C/SSR. The government uses the report to help evaluate the cost and schedule status of the project. The contractor has considerable economic incentive to “strategically manipulate” the data. The consequence of certain government decisions which rely in part on the performance reports, the complexity of the subject matter covered by the reports, and the remoteness of the decision maker from the preparer of the reports are additional reasons for the user to be concerned about information quality. In short, government users should be concerned about the potential bias in the reports. The criteria address this concern by setting minimal standards for a contractor’s MCS.

Information is of high quality if it is both relevant and reliable (Figure 1). Reliable information is necessarily bias free, valid, and verifiable. Relevant information should have feedback value, predictive value, and be timely³. Key performance measurement criteria require the contractor to regularly compute Estimates at Completion (EAC) and conduct detailed variance analysis. The criteria also foster reliable data/information by requiring an elaborate system of accuracy checks (e.g., “rolling-up” the cost data through Contract Work Breakdown Structure and functional lines) and periodic audits (e.g., surveillance visits). Criteria “ilities” such as reconcilability, traceability, visibility, etc., permeate the Joint Implementation Guide (JIG) and other criteria literature. The intent is to insure that the data provided by the contractor are reliable.

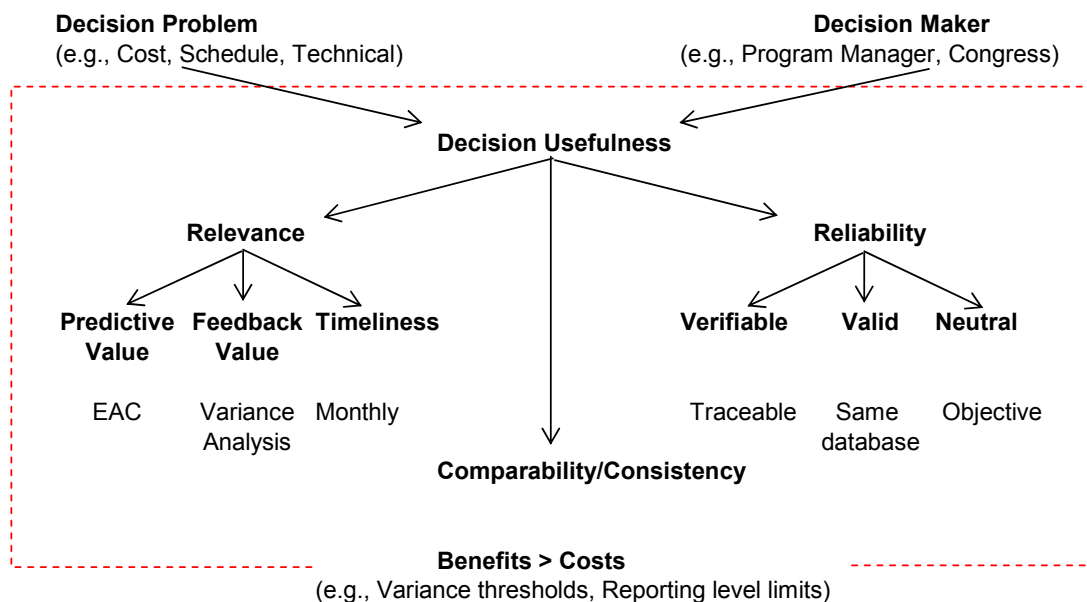


Figure 1. Information Quality and Criteria Jargon

Other qualitative characteristics of information include consistency and comparability. Data on cost/schedule performance reports should be consistently prepared through time and (ideally) between contractors to achieve comparability. One way that the criteria foster comparability and consistency is by using the Contract Work Breakdown Structure (CWBS) for organizing, analyzing, and reporting performance data. But because an over emphasis on uniform reporting can mask true differences between contractors, the criteria also emphasize flexibility and allow tailoring. Many of the guidelines in the JIG that describe the criteria are intended to be “rules of thumb” rather than hard requirements.

³ Financial Accounting Standards Board. “Qualitative Characteristics of Accounting Information.” Statement of Financial Accounting Concepts No. 2 (1980).

The criteria are directly concerned with receiving quality information from the contractor. DoD 7000.2 and the JIG identify 35 characteristics (criteria) that every “well-behaved” MCS should possess. The implicit assumption is that if the MCS is criteria-compliant, then the data/information generated by that system are of high quality.

A GENERIC MCS AND THE CRITERIA

A MCS is a system. A system is an aggregate of machines and people that work toward a common objective. A system can be described as a series of steps or phases consisting of an input phase, a processing phase, and an output phase. A control system adds measurement, analysis and reporting phases to the system. Output is measured, compared against a plan, analyzed if judged significant, and then reported back to the appropriate earlier phases of the system in the form of positive or negative reinforcement. In a management control system, data/information is typically fed back to managers of the various system phases. Responsible managers will then take appropriate action based on the data/information provided.

To help insure that the data/information supplied is of high quality, the MCS must have certain characteristics. As indicated in Figure 2, every MCS has certain generic components⁴. There must be a reliable performance measurement system. Realistic standards should be planned and maintained. The standards should be consistently and regularly compared with performance measurement data. Any variances that exceed predetermined thresholds should be enthusiastically investigated and reported to the people who have responsibility and authority to make appropriate and timely adjustments. All adjustments should be controlled, especially any adjustments that affect predetermined standards and thresholds.

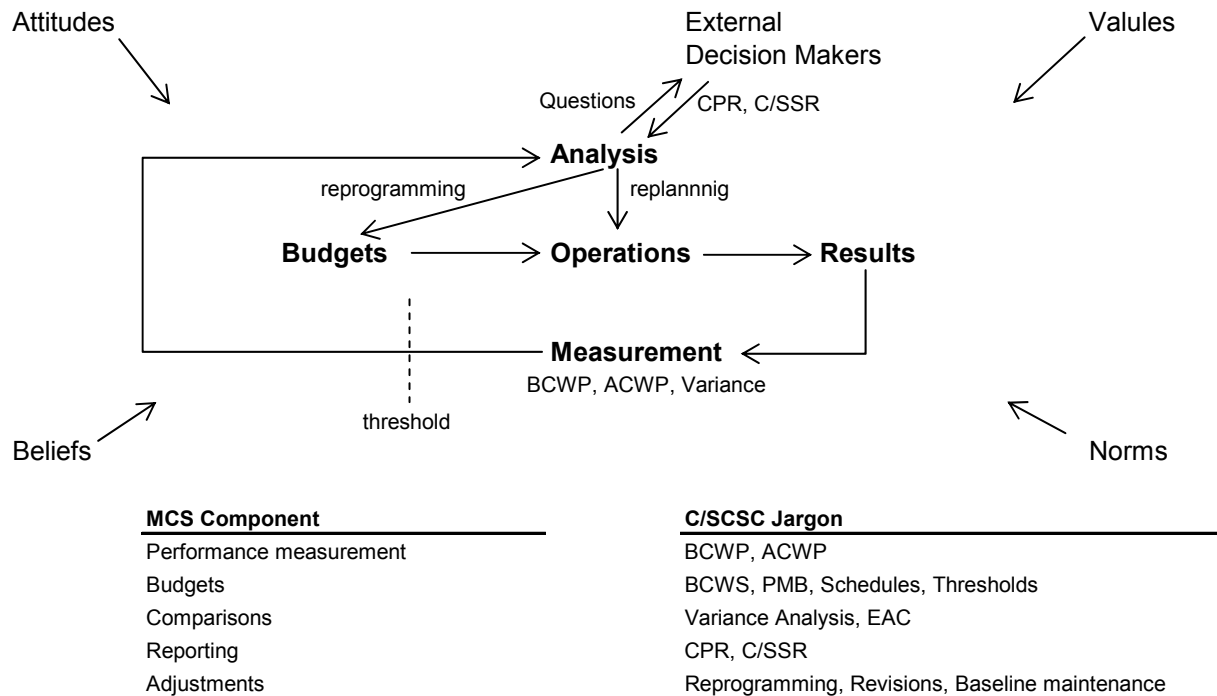


Figure 2. A Generic MCS Model and Criteria Jargon.

⁴ Flamholtz. “Accounting, Budgeting and Control Systems in their Organizational Context: Theoretical and Empirical Perspectives.” Accounting, Organizations and Society (1983).

The criteria are organized into five categories that correspond to the generic MCS components. The five categories are: Organization, Planning and Budgeting, Accounting, Analysis, and Revisions/Access. While the criteria do not specifically require the CPR or C/SSR, the MCS feedback function is essential. The CPR and C/SSR are the formal feedback reports developed to partially satisfy this function. Neither the contractor nor the government is restricted to the exclusive use of these formal reports for management of the contractual efforts. These formal reports are just one of many management tools. Informal information systems are necessary and expected.

The organization category is particularly important. The criteria require the contractual effort to be defined via the CWBS and assigned through functional lines. The criteria generally describe the intersection of the CWBS and functional lines as the Cost Account (CA). The person responsible for a CA is the Cost Account Manager (CAM). The CA is the focal point for integrating the planning, scheduling, performance measurement, and analysis functions of the system. The CAM is the person responsible for this integration.

Beyond the important task of defining and assigning the work, there are other organizational factors that can influence the effectiveness of any MCS. Two of these are the organization's structure and culture. The organization's structure is its set of rules and relationships between owners, managers, and employees. The organization's culture is the set of beliefs, values, norms, and attitudes shared by the people in the organization. Certain aspects of an organization's structure facilitate control by reducing variability (e.g., internal operating procedures and functional specialization). Other aspects of an organization's structure can influence the effectiveness of the decision making process (e.g., degree of centralization).

Similarly, the culture of an organization can drastically affect the variability of the MCS⁵. For example, for many years the Japanese attitude regarding a variance and variance analysis has been exemplary. To the Japanese automobile manufacturer, a variance is a treasure. It is doubtful that a similar attitude was held by American automobile manufacturers. The result has been a wide disparity between the quality of Japanese and American automobiles. Many American factories have begun to recognize this problem and foster new cultural attitudes among the employees. Ford's slogan "Quality is job 1," is indicative of an attempt to change the organizational culture. With respect to the DoD C/SCSC program, if either the contractor or the government sincerely believes that the C/SCSC means "chicken-something squared," then it is likely that all aspects of the MCS will fail. The performance measurement reports will be useless. Subsequent analysis of the reports will be to no avail. Any decisions that may have benefited by the information derived from the reports will be made less responsibly.

The criteria do not prescribe either an organization's structure or culture. The structure is more a function of uncontrollable external factors, such as the type of work (e.g., research or production), the required technology, and the magnitude of the contractual effort. Accordingly, structure is difficult to change, but can be influenced by committed managers. High-level government and contractor managers should continuously express their confidence and interest in C/SCSC. Mid-level managers in key positions (e.g., program managers, cost account managers, review directors, and team chiefs) should be committed to a quality MCS and be aware of the severe system problems created by improper attitudes and beliefs. C/SCSC most emphatically should not mean "chicken-something squared."

SUMMARY

As illustrated in Figure 3, the contractor provides performance reports to decision makers. The decision makers include a variety of people and functions at various organizational levels. A responsible decision involving the contractor's cost/schedule performance should be based in part on the data provided on the reports, provided that the data (1) have been properly tailored to the specific decision problem and (2) are reasonably relevant and reliable. If the contractor's MCS is criteria-compliant, then the data provided by the system are assumed to be of high quality. The *Memorandum of Understanding* and subsequent *Surveillance Reports* convey the government's confidence that

⁵ For more on organizational culture, see Elmes and Wilemon, "Organizational Culture and Project Leader Effectiveness" (*Project Management Journal*, 1988); and Ouchi, "A Conceptual Framework for the Design of Organizational Control Mechanisms" (*Management Science*, 1979).

the assertions made by the contractor in the form of performance reports and system descriptions are reasonably justified. These “comfort letters” are valueless, however, if the organizational culture concerning the criteria is defective.

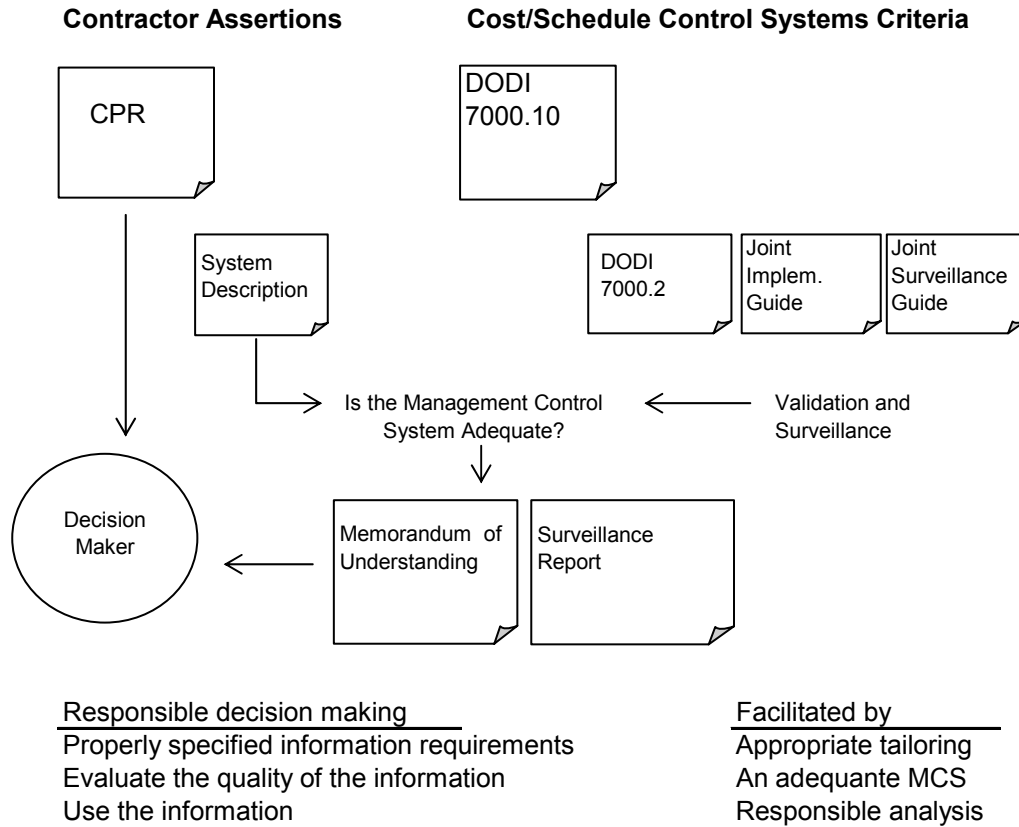


Figure 3. Contractors Assertions and the Criteria.