

## **A Concept Map for Management Control System Design**

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*Design is a central and defining task of management accountants. Robert Kaplan, upon receiving his award for Lifetime Achievement from the American Accounting Association noted that: "Accounting Systems, like engineering designs are constructed, not natural phenomenon....Nobel-laureate Herbert Simon observed....'design is the core of all professional training'" (Kaplan, 2006; Simon, 1996). In this paper, I use Concept Mapping as a platform to support the design task as it relates to Management Control Systems: a sub-discipline of Management Accounting.*

### **INTRODUCTION**

"Management accounting is a profession that involves partnering in management decision making, devising planning and performance management systems, and providing expertise in financial reporting and control to assist management in the formulation and implementation of an organization's strategy."

The above definition of management accounting was recently developed by the Institute of Management Accountants (2008). In essence, the statement suggests a unique set of competencies held by individuals that help an organization formulate and execute strategy. In a sense, the profession of Management Accounting is returning to a management focus that was suggested by Robert Anthony of Harvard University over forty years ago (Anthony, 1965). Management Control Systems, as defined by Anthony, was that part of Management Accounting that was concerned with aligning the interests of organizational members with the goals of the organization or "goal congruence". One way in which this goal could be achieved was by designing the appropriate performance measures (usually based on the accounting system) that would motivate managers of organizational units to make decisions that used resources effectively (met goals) and efficiently (output vs. input). In 1988, Anthony revised his original definition of Management Control Systems to the following:

"Management Control is the process by which managers influence other members of the organization to implement the organization's strategies." (Anthony, 1988, p. 10)

A common focus between Anthony's definition and the Institute of Management Accounting definition is the implementation of an organization's strategy. This emphasis has the support of leading management practitioners. For example, the following comment was made by Louis Gerstner, former CEO of IBM:

“...execution is the really critical part of a successful strategy. Getting it done, getting it done right, getting it done better than the next person is far more important than dreaming up new visions of the future.” (Gerstner, 2002)

Furthermore, in the 2007 survey of CEO’s conducted by the Conference Board, “Excellence in execution” was ranked as the number one issue of greatest concern facing today’s CEO. This was followed by “Consistent execution of strategy by top management” as the number three issue.

Thus the focus of management accounting on strategy implementation is consistent with the needs of modern management. At the same time, this focus marks a return to scholarly inquiry that finds its seminal work published in 1965. In the following sections, I will discuss the nature of control systems, how the process of control system design can be understood and the use of “concept maps” as a supporting framework for management control system design.

## **CONTROL SYSTEMS ARE DESIGNED, NOT DISCOVERED**

Robert Kaplan of Harvard University has received a number of awards for his contributions to the field of Management Accounting (Activity Based Costing and The Balanced Scorecard are examples). Upon receiving the American Accounting Association Management Accounting Section Lifetime Achievement Award, Kaplan made the following point in his address:

“Accounting systems, like engineering designs, are constructed, not natural phenomena. Management accountants create, design and build systems, and then imbue these systems in organizational processes and routines. Management accounting is, as Nobel-laureate Herbert Simon described, a ‘science of the artificial’ (Simon 1996). Simon observed, ‘design ..... is the core of all professional training; it is the principal mark that distinguishes the professions from the sciences.’” (Kaplan, 2006).

The point is that management accounting, being a profession, has design at the core of what a management accountant does. In addition, designs are not immutable laws waiting to be discovered; they are created in response to a need held by managers of organizations. That need may be expressed as: “How can we implement our strategy?” Management control systems are designed in order to help managers execute strategies within their organizations.

Design is frequently mentioned by management accounting academics but has not been a focus of attention. To provide evidence of this state of affairs, I analyzed the papers presented at the 2007 Mid-Year Case and Research Conference of the American Accounting Association Management Accounting Section. Seventy-eight papers were presented at the conference and the word “design” appeared a total of 950 times for an average of 12.2 times per paper. Four papers never used the word design and one paper used the word 110 times. Most often the word “design” was used in a phrase similar to: “...(insert topic of the paper) is important for management accounting system design.” However, design itself was neither the focus or even defined by any of the papers. On the other hand, the majority of the papers were empirical studies that gathered data which were then analyzed mathematically in order to test various hypotheses derived from previous literature. This is the normal expectation of papers at academic accounting conferences and there are strong incentives for faculty members to engage in such scholarly enquiry. However, what Robert Kaplan was implying in the above quotation is that we have overlooked the central function of design itself in the profession of management accounting.

In this paper, I suggest a method which will aid in the design of management control systems. The paper is based on the presumption, consistent with the definition of management accounting and the needs of senior managers, that the profession of management accounting and the focus of at least a significant portion of scholarly work in management accounting/control should focus on the problem of the *design process* of management accounting/control systems.

## DESIGN AND CONCEPT MAPS

Design itself is a field of scholarly inquiry. Herbert Simon (1996) defined design as a set of “wicked” problems. These are problems for which finding solutions are very difficult and each solution creates new problems to be solved. The field of design research includes design issues in architecture, in manufacturing processes and products ranging from toasters to fighter aircraft. Bayazit (2004) reviews forty years of research design. Of particular interest to the topic of this paper, is the following quotation from Hubka and Eder (reported in Bayazit, 2004, p. 26):

“The term ‘design science’ is to be understood as a system of logically related knowledge, which should contain and organize the complete knowledge about and for designing.”

Thus for the practical problem of designing management control systems, it would be useful to have a method for displaying the concepts that have some bearing on the management control system design task as well as showing the relationships among concepts. In connection with the above quotation, we are looking for something that would organize our knowledge of management control for the purpose of designing management control systems.

One tool that could be used for this task is known as “Concept Maps” (Novak and Cañas, 2007). Concept maps are graphical tools for organizing and representing knowledge. In this paper, one could think of a concept map as a graphical literature review. The advantage of the graphical representation is that we can see how the concepts are related more easily.

To begin, a few definitions are in order. A concept map should be constructed in relation to a particular problem for which we seek an answer. This is called a *focus question*. A *concept* is defined as a perceived regularity in events or objects designated by a label. Thus a “Profit Center” which is a term used often in the Management Control literature, may be considered a “concept”. Propositions contain two or more concepts connected by linking words or phrases to form a meaningful statement. For example, the phrase: “Responsibility Centers include Profit Centers” links two concepts. Responsibility Center and Profit Center are linked by the word “include”. The complete phrase is a *proposition*. Finally, a *cross-link* is a proposition that connects concepts from different domains or sections of a concept map.

Two characteristics about concept maps are particularly helpful for our task of designing management control systems because they facilitate creative thinking about management control problems. The first is the hierarchical structure of a good map which gives order to the concepts and the second is the ability to search for and characterize cross-links. Cross-links often represent creative leaps in our understanding about design issues.

This section can be summarized in the following manner: The design task is a complex and creative process. A concept map is a tool that aids in the design task by organizing our knowledge (about management control systems) and facilitating creative leaps from one aspect of management control to another. In the following section, I present a first attempt at such a concept map.

### A CONCEPT MAP FOR MANAGEMENT CONTROL SYSTEM DESIGN

The literature on management control spans decades and is included in disciplines other than management accounting. In their recent review of the management control literature, Berry, *et al.* (2009) conclude: “As the preceding review indicates, the field of MCS research is fragmented, with different researchers examining different aspects of control systems design and use, often adopting very different theoretical perspectives.” Therefore, this initial attempt is limited by my own knowledge of the area and can be considered as a starting point for the continuing development of the concept map.

The first step in designing a concept map is to develop the “focus question”. Referring to Anthony’s definition of Management Control, above, the focus question becomes: “How do managers influence members of an organization to implement strategy?” The next step is to search the literature on

management control in order to identify concepts. Finally, we attempt to connect the concepts with linking words to form propositions. My first attempt is presented as Figure 1.

In presentations where I have presented the map, the immediate reaction tends to be: “It’s so complicated!” Yes, it is complicated and this explains why strategy implementation is so challenging (see Louis Gerstner’s comment, above). On the other hand, it also raises questions when a new management technique is provided as “the answer” to the successful execution of strategy. With any new management “innovation”, it is very useful to situate the proposed concept within the concept map in order to provide context.

The use of the map can best be shown by using an example (I only provide a cursory overview in order to convey the nature of the process). Suppose a university has completed a strategic planning process and now wishes to turn to the challenge of implementing the strategy. Beginning at the top of the figure, we can first consider the nature of a university as an organization. Having developed a “strategy”, the university is conceived as an “instrumental” organization where goal congruence among organizational members can be enhanced through compensation (based on Etzioni, 1961). This is an alternative to the view of a university as a “normative” organization: “a community of scholars”. Normative organizations require very few formal controls.

Moving down to “strategies” we see an important dichotomy between “activities” and “controls” (I had not perceived this dichotomy until I built the map). A member of the university (a faculty member) undertakes both decisions to act and actions. The actions (teaching, scholarship) have very low task certainty (Perrow, 1979). Nor are the decisions well-understood or non-programmable as defined by Simon (1960). The key decision made by a faculty member as an organizational participant is how he or she will spend his or her time. This is not a “once and for all” decision but one which is made regularly. This leads to the concept of a system where there is feedback. However, within a cybernetic feedback loop control system, four necessary conditions must be present for effective control to exist (Otley and Berry, 1980).

Now going back up the map to the other part of the dichotomy, we find that strategies are implemented through “controls”. Controls have been classified in a number of frameworks and they are represented on the right side of Figure 1. In our university example, faculty members are “influenced” (Itami, 1977) through incentives (tenure, promotion). However, they can also be influenced by setting standards of performance (which affects problem recognition) and tying incentives to performance (consequences of choice of actions).

The *design problem*, from within the concept map, is to link the “Activities” side of the concept map to appropriate “Controls” side of the concept map. This is the creative leap depicted by “cross-links” in concept map terminology. Returning to our example, we may find that, because of the task uncertainty inherent in the work of a faculty member, social controls and screening (the hiring decision) are far more effective than an influencing type of control system. Therefore, the university management may direct substantial resources to recruiting in order to match faculty values with organizational values and may seek individuals with personalities who can inspire others to follow goals set by the university. On the other hand, if a consulting firm suggests a “Scorecard” as “the answer” for our fictitious university, we would discount such a proposal because the linkages in the concept map simply are not there.

## FUTURE USES OF THE CONCEPT MAP

There are at least two avenues for a concept map driven program for improving management control system design. The first is through “mass collaboration” as described by Tapscott and Williams in their book [Wikinomics: How Mass Collaboration Changes Everything](#). The concept map in Figure 1 was developed through free software provided by the Florida Institute for Human and Machine Cognition. The Institute also provides facilities for sharing concept maps. In other words, anyone with an internet connection can access the concept map in Figure 1. Furthermore, through appropriate authorizations, anyone can modify and/or elaborate the map. Thus, it would be possible for a group of researchers in Management Control to collaborate in developing a concept map that reflects the current consensus in the

field. Since management control covers a wide range of disciplines, the benefit of having the concept map as a unifying device is clear.

The second possibility addresses the following critical issue facing the research enterprise in business schools by the Association to Advance Collegiate Schools of Business (AACSB) task force on Impact of Research:

“... opportunities to support deeper, more continuous interaction between faculty and practicing managers on questions of relevance have not been fully developed...”  
(AACSB, 2008, p. 29)

In universities with on-line MBA programs where many students are practicing middle managers, the opportunity exists for practitioners to be involved in management control research by making them aware of the concept map for management control systems design. Using their real organizations, they could participate in research projects that would extend or revise the concept map. Thus the concept map can be used to address the issue of collaboration between faculty and managers identified by AACSB.

## SUMMARY

In this paper, I have identified the central importance of design in Management Control Systems and Management Accounting more generally. I then introduce concept maps as both a device to support the design process in Management Control and as a tool for collaboration among Management Control scholars and practitioners.

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**FIGURE 1**  
**A CONCEPT MAP FOR MANAGEMENT CONTROL**

