Chapter III
The Architecture of Knowledge

ABSTRACT

This chapter introduces the layered structure of knowledge and describes why chaos rides wings of change and adaptation. It tells us how traditional analytical approaches, like functional decomposition, can lead to chaos when the size and complexity of business processes and information systems exceed a critical threshold.

THE END OF COMMON SENSE: HIDDEN CHAOS IN THE HEART OF COMPLEXITY

Why has change been so hard on information systems? What methods worked in a smaller, simpler age and why have they started failing? Why does the impact of change ricochet through our systems explosively and chaotically, and above all, why is it so hard to manage?

We must have these answers to understand root causes. Only then can we fashion solutions that will fit the age of knowledge with its unceasing, pitiless, and ravenous appetite for rapid change driven by the race of survival in a shifting landscape of high stake, chimerical, and short-lived opportunities. Therefore, let us digress briefly to understand lessons learned and the reasons why older methods are failing.

Systems analysis and design methodologies had their conceptual beginning in two basic techniques for building abstract models. Both approaches had their genesis in the behavior of physical and engineering, not business, systems.[1] Many of our problems with managing change and reusing knowledge stem from the intrinsic limitations we inherited from these two techniques. They cannot scale up to satisfy our current needs for far more complex and vastly larger *business* systems. Most analysis and design techniques in use today were derived from one of two fundamental techniques, and, unaware, we still carry their hidden legacy of limitations. The two fundamental techniques are:

1. Black box process decomposition technique
2. Node branch technique

Variations of these two themes were later extended to modeling business systems. These early models of physical and engineering systems involved fewer objects and relatively simple be-

haviors compared to modern, industrial-strength business systems.

To understand why neither method can scale up to satisfy the demands of 21st century business, we must understand the two approaches and their limitations. Only then can we chart a new course away from the pitfalls of the old.

Black Box Process Decomposition: Why it Failed

The black box approach[2] was a simple stimulus-response model consisting of inputs, outputs, and a set of rules, called a *transform* or *transfer function,*[3] relating outputs to inputs. Inputs and outputs were called variables.

Implicit in the model was the assumption that values of output variables would respond to changes in values of input variables (possibly with a time delay) as described by rules within a box linking inputs to outputs. The box was called a *black* box because it was opaque or dark: the mechanisms inside the box, those that created or manifested their external behavior in the rules, were unknown and irrelevant to the model. Only the rules themselves were of interest. Figure 3.1 illustrates the concept.

There are four inputs and three output variables in Figure 3.1. Variables 1-7 are each represented by labels v1 through v7. V1 through v4 are input variables, represented by arrows pointing into the black box, whereas v5 through v7 are output variables, represented by arrows emerging from, and pointing away from, the black box.

The graph on the left shows how values of input variables change over time, whereas the graph on the right shows how values of output variables change over time in response to changes in values of input variables.

Figure 3.1. The black box perspective of behavior