# Chapter II
Introduction to
Structure of Knowledge

ABSTRACT

This chapter introduces the concept of the metamodel of knowledge. The chapter:

- *Defines knowledge and introduces the concept of the atomic rule as the building block of knowledge*
- *Describes the need for coordinating business knowledge, the difficulty of doing so, and how normalization of knowledge can facilitate its coordination and lead to the development of agile software*
- *Introduces the concepts that show how knowledge can be normalized and assembled from components*
- *Introduces the concept of a business process and services as derivatives of business knowledge*
- *Introduces the concept of modeling of behavior*
- *Introduces the problem of multiple clashing perspectives of reality from which knowledge is assembled*

Figure 2.1. Knowledge is the meaning of business practices, rules, goals, guidelines, and their respective roles in the integrated whole
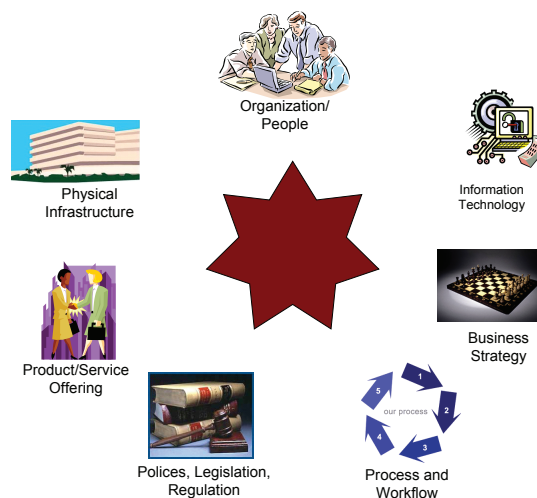
INTRODUCTION TO KNOWLEDGE

Knowledge involves understanding, the understanding of meanings. Business knowledge involves understanding of goals and guidelines, opportunities and operations, threats and constraints, strengths and weaknesses, policies and practices, reasons and rationales, as well as their interrelationships. Knowledge is also a pattern of information that includes breach and recovery: what must be adhered to, what can be overlooked, and under what circumstances. In today's fast paced global environment, one must possess intimate knowledge of the rapidly evolving global marketplace and its impact on the current and planned set of products and services.

Knowledge represents a coordinated set of information: rules of business, imposed by man or nature, either explicitly stated or implied. Knowledge must address both what one should do and what one should not, as well as how to do it and how not to do it. In some business schools today, students are taught both implementation and counter-implementation strategies; the latter focuses on the use of knowledge to avoid getting into painful situations.[1]

Knowledge consists of assertions, described by rules, caveats, constraints, issues, and guidelines. Knowledge possesses structure. Engineers have long fabricated complex structures from simple parts. Relatively small components are first assembled into simple subassemblies, which in turn serve as the building blocks for larger, more complex, assemblies. This process is continued until the final machine or equipment is produced. Knowledge is similar: it is aggregated from isolated facts, but unlike a machine, its components are harder to perceive because they are abstract patterns of information; we understand information but cannot see, hear, taste, touch, or smell it. However, we *can* understand it by abstracting the inputs of our five senses.

Meaning and understanding are abstract, but they are similar to the physical world in yet another way. We learned from fundamental chemistry that we can divide and subdivide substances until we reach the stage of molecules without losing information on what the substance is. However, if we divide the molecule, we change the identity of the substance and lose information on its behavior and properties. Similarly, to identify the components of knowledge, we must distinguish between assertions whose division will involve no loss of information, and assertions whose division will sacrifice meaning: if an assertion is decomposed into smaller parts and the "lost" information cannot be recovered by reassembling the pieces into a "subassembly of knowledge," then the decomposition has gone too far. The fundamental rules that cannot be decomposed further without irrecoverable loss of information are called *indivisible rules, atomic rules,* or *irreducible facts.*[2]

Ambiguity, uncertainty, or a different meaning imply loss of information. Consider the following assertion:

Frank is a man who has a daughter named Sarah

This fact consists of two simpler facts which, when considered together, unambiguously mean *Frank is a man who has a daughter named Sarah*:

1. Frank is a man
2. Frank has a daughter named Sarah

Because the meaning, "*Frank is a man who has a daughter named Sarah,*" may be reconstituted from simpler, shorter facts, it is not an atomic rule (also known as an irreducible fact). However, if we tried to break the second of the two assertions above into smaller assertions, we would lose information.

Now consider the assertions:

2.1. Frank has a daughter
2.2. A daughter is named Sarah

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