

It is vital to create a good Foundation (or good science) Layer.

Basic research and applied research are two vital parts of the research ecosystem to address any technological problem, where pure or basic research creates a theoretical foundation comprising pure scientific knowledge such as well-tested theories, concepts, methods, and observations or evidence, which are vital to gaining essential insights to understanding the reality or real-world things and phenomena. It is impossible to conduct applied research in thin air without having a good or bad theoretical foundation for it, as it is impossible to construct a house in the air without having a good or bad foundation.

Applied Research Layer#2: Applied Research for CBSE is conducted (by relying on an available or prevalent good or bad theoretical foundation) to invent tools, methods, and technologies to create real software components; and to use the components to build software products by inventing more tools, methods, and mechanisms of CBE.

It is impossible to build a house in thin air, without a good or bad foundation for it. Similarly, it is impossible to conduct applied research for CBSE in thin air without having a good or bad theoretical foundation (or theories), such as below:

Foundation Layer#1: Theoretical Foundation or basic scientific knowledge for CBSE comprises theories, concepts, evidence, and definitions or descriptions to understand (i) essential properties of components, (ii) anatomy, construction, and structure of CBPs; & (iii) methods and mechanisms of CBE (Component-based Engineering).

A good theoretical foundation implies that it comprises valid scientific knowledge comprising well-tested without violating proven principles of the scientific method and validated theories, methods, concepts, descriptions, and evidence. A bad theoretical foundation implies that it comprises voodoo scientific theories, beliefs, unproven concepts, methods, and flawed definitions or descriptions. Examples of bad theoretical

foundations include (a) the 16th-century geocentric illusion and (b) the existing theoretical foundation or voodoo scientific knowledge about so-called components and CBE.

Applied research cannot be successful if it is forced to rely on bad science. That is, it is impossible to even begin conducting applied research without having a theoretical foundation, and applied research can never be successful if its theoretical foundation is bad or flawed. There is no exception for applied research in CBSE from these two rules.

Any scientist is a voodoo scientist if he cannot understand the vital role of a good science (i.e., having a good foundation) in conducting applied research. The existing theoretical foundation for CBSE research has been accumulated for more than 50 years and comprises countless theories, definitions or descriptions, concepts, and methods for so-called software components and CBE for software. *This knowledge in basic science layer#1 shapes our mental, conceptual model or perception of the reality of real things.*

Since it is impossible to begin applied research for CBSE without having any good or bad ideas/beliefs (i.e., first principles), computer science created ideas/concepts, more than 50 years ago, such as bad definitions for components. Hence, I am forced to create Componentology (i.e., a good conceptual model), since existing knowledge to understand components in the foundation for CBSE, such as theories, concepts, and descriptions, are pure fiction or illusions without having valid & testable basis in reason, logic, or reality.

For example, the existing scientific knowledge about components and CBE in the theoretical foundation cannot even answer simple questions such as (i) what the striking or obvious differences between components and other kinds of parts are, and (ii) what the striking or obvious differences between engineering disciplines that employ the real CBE and those that do not use CBE are: <http://componentology.org/VoodooScience.pdf>

Two vital parts (or layers) of the research ecosystem:

Basic Research/Science & Applied Research.

Applied Research Layer#2 (or the upper layer): Applied Research for CBSE (Component-based Software Engineering) is conducted (by relying on the prevalent or available good or bad theoretical foundation comprising theories, concepts, axioms, or beliefs in basic science layer#1 below) to invent tools, methods, & technologies to create real software components; & to use the components to build software products by inventing more tools, methods, and mechanisms of CBE.

Theoretical Foundation (or basic science) Layer#1 (or the lower layer): Theoretical Foundation or basic scientific knowledge for CBSE comprises theories, concepts, evidence, axioms, beliefs, and definitions or descriptions to understand (i) essential properties of components, (ii) anatomy, construction, and structure of CBPs; & (iii) methods and mechanisms of CBE (Component-based Engineering).

- ➔ It is impossible to even begin constructing a house in thin air, without having a good or bad foundation for it. Similarly, it is impossible to even begin applied research (in layer#2) for CBSE in thin air without having any good or bad concepts, axioms, beliefs, or descriptions (e.g., of basic building blocks such as components and methods for CBE) in the theoretical foundation in layer#1.
- ➔ It is impossible for any applied research in layer#2 to successfully address any unsolved technological problem (e.g., real CBSE), if the basic science in layer#1 is voodoo science comprising flawed theories, concepts, methods, or descriptions (e.g., for basic building blocks such as components and CBE).