



## ***Random Fact 12.2***

### **Software Development—Art or Science?**

There has been a long discussion whether the discipline of computing is a science or not. We call the field “computer science”, but that doesn’t mean much. Calling a discipline a science doesn’t automatically make it so. A scientific discipline operates on the *scientific method*: by posing hypotheses and testing them with experiments that are repeatable by other workers in the field. For example, a physicist may have a theory on the makeup of nuclear particles and attempt to confirm or refute that theory by running experiments in a particle collider. If an experiment cannot be confirmed, such as the “cold fusion” research in the early 1990s, then the theory dies a quick death.

Some software developers indeed run experiments. They try out various methods of computing certain results or of configuring computer systems, and measure the differences in performance.

Some computer scientists discover fundamental principles. One class of fundamental results, for instance, states that it is impossible to write certain kinds of computer programs, no matter how powerful the computing equipment is. For example, it is impossible to write a program that takes as its input any two Java program files and as its output prints whether or not these two programs always compute the same results. Such a program would be very handy for grading student homework, but nobody, no matter how clever, will ever be able to write one that works for all input files. However, the majority of computer scientists are not researching the limits of computation.

Some people view software development as an *art* or *craft*. A programmer who writes elegant code that is easy to understand and runs with optimum efficiency can indeed be considered a good craftsman. Calling it an art is perhaps far-fetched, because an art object requires an audience to appreciate it, whereas the program code is generally hidden from the program user.

Others call software development an *engineering discipline*. Just as mechanical engineering is based on the fundamental mathematical principles of statics, computing has certain mathematical foundations. There is more to mechanical engineering than mathematics, such as knowledge of materials and of project planning. The same is true for computing. A *software engineer* needs to know about planning, budgeting, design, test automation, documentation, and source code control, in addition to computer science subjects, such as programming, algorithm design, and database technologies.

In one somewhat worrisome aspect, software development does not have the same standing as other engineering disciplines. There is little agreement as to what constitutes professional conduct in the computer field. Unlike the scientist, whose main responsibility is the search for truth, the software developer must strive to satisfy the conflicting demands of quality, safety, and economy. Engineering disciplines have professional organizations that hold their members to standards of conduct. The computer field is so new that in many cases we simply don't know the correct method for achieving certain tasks. That makes it difficult to set professional standards.

What do you think? Based on your experience, do you consider software development an art, a craft, a science, or an engineering activity?

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