

Computer Science is a Craft

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Historians often chronicle the beginnings of computer science. They connect the sometimes-sparse dots of mathematical and mechanical achievement of epochs past to a relatively young craft still defining itself. The American Heritage dictionary defines computer science as “the study of computer technology, including hardware and software.” This is very enlightening in that even the definition of the term “computer science” is not even as well developed as the definitions of contemporary fields. Frank Harary, Frederick Brooks, Jr., and other pontificators of our time express similar views that computer science is most definitely not a science. What is it? I believe that computer science is not an art form, it is a craft: building on an art that is as old as one would like to conjecture.

What is an art form? One dictionary defines an art form as “An activity or a piece of artistic work that can be regarded as a medium of artistic expression.” At this moment, you might agree. Most computer scientists would be happy to argue that computer science is in fact an art form. First, a competent, creative computer scientist can do magic with her tools, right? She can even build tools to perform new tasks and to perform them faster! She can build a building like no other with these tools as a foundation. So, is architecture an art? Too many of the tools we use are built by others. Too much of the foundation on which we raise our masterpiece is the work of others. To call our occupation an art form would be to call a solid slab of tempered steel flexible.

The late Frank Harary, faculty at the University of New Mexico, said, “Any field that has the word science in its name is guaranteed thereby not to be a science.” Science is generally conceived to epitomize the organized body of knowledge that our species knows about our world. Closely tied to science is the scientific method, which has stood the test of time to help us discover the unknown. Computer science, like mathematics, which is widely accepted not to be a science, is intimately attached to the sciences as it leverages their newest developments. Computer science in its young age lacks the discipline and the specific pattern of behavior of the sciences.

Frederick Brooks, Jr. the author of The Mythical Man-Month frequently refers to computer science as a craft. How is a craft different from an art form anyway? Craft is usually the consistent, proficient, practice of skilled artistry. Brooks states that “the sheer joy of making things” is one reward of the craft. The first definition of art is described as the “human effort to imitate, supplement, alter, or counteract the work of nature.” Even more helpful are the stream of key terms we can locate in the full definition: non-scientific, principles, methods, expertise, technique, precision, study, execution, stratagems, tricks. Computer science is a very hands-on effort whether at one layer of abstraction or at another. Yet, this is the very essence of craft.

Science, unlike computer science, has rarely been the object of rapid adoption, and the bane of so much business. Computer science has survived this while still establishing itself. With little theory to look to, and the core of its discipline still being written, computer science is sticky business. Its practitioners often fall to the ease of implementation without reflection and few journeymen are found. The future is full of opportunity and even more requests and requirements of a culture entwined in masses of new untested technology. For now, the celebrated practice of the craft will remain in the dominion of those who can master the artistry of managing people, making tools, leveraging science and tricking technology to satisfy the opposing impulses to rise in business and solidify the foundation of computer science. One day, the craft of computer science may enter the arena of applied sciences, but it will never be a true science.

Sources:

- The American Heritage® Dictionary of the English Language, Fourth Edition
- The Mythical Man-Month, Frederick P. Brooks, Jr.

Correspondence about the late Frank Harary

-----Original Message-----

From: Conley Read [<mailto:cread@cs.ucr.edu>]
Sent: Thursday, January 13, 2005 4:27 PM
To: Tolbert, Doug M
Subject: If it has science in its name...

Hi Doug,

The quote that you asked about in class is attributed to Frank Harary by multiple sources. The quote was difficult to locate as it appears to have been verbal and not in print by Harary himself.

The full quote:

"Any field that has the word science in its name is guaranteed thereby not to be a science."

Here are just a few attributions by others among some quotable quotes:

www-tcad.stanford.edu/~yergeau/quotes.shtml
www.axanodus.com/info/quotes/

Gerald Weinberg attributes the phrase to Harary in his book *_An Introduction to General Systems Thinking_* [1975] ...

"The misnaming of fields of study is so common as to lead to what might be general systems laws. For example, Frank Harary once suggested the law that any field that had the word `science' in its name was guaranteed thereby not to be a science. He would cite as examples Military Science, Library Science, Political Science, Homemaking Science, Social Science, and Computer Science."

More about frank - he was faculty at NMSU

<http://www.cs.nmsu.edu/~fnh/>

It appears that he passed away this month [1921-2005]

<http://www1.cs.columbia.edu/~sanders/graphtheory/harary.html>

Other quotes attributed to Frank

If we knew the future, it will be here now.

-- Frank Harary

By the way, we have Weinberg's book in the UCR science Library.
That's about it.

See you tomorrow,
Conley