

WHAT IS IT?

The Technology of Information Enables Mechatronic Problem Solving

Recently there has been much publicity about a planned engineering and applied sciences campus in New York City. Several U.S. and foreign universities are teaming together to compete for this opportunity to create a center which could rival the high-tech hubs in Boston and the Silicon Valley. The list of disciplines the city states the center would focus on got my attention, as Information Technology (IT) led the list. I shouldn't have been surprised; over the past decade many colleges with the words Information Technology in their names had been created. But what is Information Technology, and why is it growing in importance? What is its relationship to engineering and to mechatronics? Depending on whom you ask, you will get a variety of answers.

To get a better understanding of this widely misunderstood field, I turned to a colleague, one with a unique perspective. George Corliss is a Professor of Electrical & Computer Engineering at Marquette University with over 40 years experience in mathematics, computer science, and computer engineering. He and I always try to find ways to be inclusive, and so our discussion took that tack. He started by turning the title around to focus on the Technology of Information; that was eye-opening and led to valuable observations.

Human beings are inherently problem solvers, and all disciplines (e.g., business, social science, science, and engineering) need critical-thinking problem solvers. Problem solving requires complete, accurate information at the right time and in the right context. This becomes more of an imperative when solving complex problems, as complexity must be managed to avoid catastrophe. The technology of information deals with acquiring, transmitting, storing, analyzing, disseminating, and applying information in human-centered problem-solving activities. But that information must be transformed into useful knowledge for the problem at hand. That is the critical connection between all problem-solving disciplines and information technology. In mechatronics and engineering, systems have two domains: the power domain of sensors, actuators, and mechanical systems, and the information domain of computer control and human interfacing. But IT is so much more than that, and success in human-centered design depends on it.

An analogy that applies here is the field of controls. Controls is a pervasive, enabling technology that for many years was thought of as the domain of the specialist and applied as an after-thought add-on, even though it was essential. Now we appreciate well that integrating controls into a system design from the very start of the design process leads to a superior design where all trade-offs are available. The challenge, of course, is not in realizing that something must be done, but in actually making it happen. The same can be said for information technology. If information technology, as a discipline, is separate and uninvolved from any discipline problem-solving process, a system without focused, timely information results, which may not be desirable, viable, sustainable, or usable. Simply put, it might be the wrong solution for the problem.

Is this happening now? If so, how can this be changed; if not, how can this be prevented from happening? It is all about culture and perception. Information technology practitioners are tool

builders and integrators, not servants to set up and maintain computer systems and install software. They focus on the fundamentals of human-computer interaction, information management, programming, networking, and web systems; information assurance and security; system administration and maintenance; and system integration and architecture. They must have an ability to identify and analyze user needs and take them into account in the selection, creation, evaluation, and administration of computer-based systems, as well as an ability to effectively integrate IT-based solutions into the user environment. Interaction is a two-way street, and we must all embrace this for the competitive advantage for which we all strive.

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