

Services Science, Management, and Engineering: A Computing Perspective

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My perspective is that of a computer science professor, involved in research and education in the area of information and data management. I've been in computer science since 1973 when I began my undergraduate studies. As a computer science major, I had the choice of selecting the "scientific option" or the "business option". The scientific option was the more prestigious option, loaded with numerous credit hours of advanced math courses for those who wanted to pursue computer science research. The business option was viewed as the softer side of computing for those who wanted to develop applications. I actually did a little bit of both, beginning in the scientific option and finishing in the business option. Years later, I'm still doing a little bit of both. And I'm convinced that the future of computing lies not in the choice between the scientific route or the business route, but in the closer integration of both disciplines.

The shift to a services-based economy has changed everything. Although the computing community has responded with research in service-oriented architectures and service-oriented computing, significant advances in computing solutions for services innovation will only occur with significant changes in the way we conduct research and education, producing information technology professionals who not only understand the need for *intelligent, adaptable, and secure* computing solutions, but who also understand the *business context* that drives the volatility of enterprise applications and the *engineering context* that drives the need for the scalable design of such systems. There is nothing soft about the computing challenges posed by these application requirements.

At Arizona State University, we are addressing these challenges through the development of a trans-disciplinary effort to establish a program that we refer to as *Collaborative Enterprise Services Ecosystems*, integrating research and education in computer science, industrial engineering, information systems, and services leadership in the study of the dynamic and self-adjusting behavior required for the support of business-to-business and business-to-customer collaboration in a service-oriented environment. The development of such a program requires an innovative curriculum with interdisciplinary teams of students immersed in the study of use cases from specific application domains. The development of such use cases requires a new educational approach that involves working closely with industry partners in a manner that will allow students to investigate application challenges and globalization issues that cannot be easily replicated in a typical university environment. We envision a research methodology that is focused on the development of the *enterprise physics* (i.e., laws, properties, models, metrics, scale, semantics, and knowledge dimensions) that is needed to lend a sound basis to service computing.

Achieving this vision is a difficult task, however. We need support from university administration that recognize the importance of Services Science, Management, and Engineering and invest in the type of interdisciplinary interaction that is needed to foster the development of such a program. We need support to build the types of bridges to industry partners that are critical to the development of new approaches to education and research. We need federal funding programs that support research on enterprise physics and innovative educational approaches. We most of all need programs that do not force students to make a choice between computing, engineering, or business, but instead emphasize that advancements for conducting distributed commerce in a service-oriented model will only occur by coupling a science-based foundation with a cultural change in the education and research process – one that brings computing, engineering, and business researchers together to study integrated solutions to the difficult challenges that are essential to the success of the service sector of businesses that drive our economy and quality of life.