EDITORIAL

How Do We Pay For It?

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How do we find the money to pay for structural testing and computer aided engineering technology? Technology moves on, in terms of newer and better hardware and software, and the cost, compared to 1975 dollars, is very reasonable. Yet, justifying the cost and finding the funds is always a problem further complicated by the ups and downs of the economy. As someone who works in both the education field and with industry, I know this is a constant struggle for all of us. Certainly, government funding and tax policies affect how each group approaches the problem. Ultimate resolution may lie in considering problems locally but acting on them globally through professional societies and organizations.

At academic institutions, hardware and software for laboratories is often funded separately from the general computing environment. This is justifiable since all students need and benefit from access to computing and only a limited number of students need and benefit from laboratory technology. Even so, an increasing number of engineering and science departments require their students to purchase their own personal computers. The cost of supporting technology in laboratories is carried mostly by engineering and science departments. While the university understands that such support requires a differential amount of funding, it is rarely sufficient to keep labs updated with relatively current hardware and software. In my case, the budget for new or replacement lab equipment for all labs in a Mechanical Engineering Program that serves approximately 400 undergraduate students, 150 graduate students and 40 faculty and staff is $45,000 per year. There is no identifiable budget for equipment repair.

Frequently, the research and consulting activities at a university provide a portion of this support. In engineering and the sciences, it is imperative that both undergraduate and graduate students have access to, and understand, the technology used by industry. Government funding is available but is very limited and is rarely available for technology areas that are considered mature and/or application focused. Unfortunately, structural testing and computer aided engineering technology mainly falls into these categories. A further example of this problem is the proposed cut of $100 million for the National Science Foundation in the U.S. budget for 2005. This trend will only make matters worse. Thankfully, many vendors go out of their way to provide hardware and software at reduced prices to educational customers. This relationship benefits the vendors to a degree and is of great value to the academic institutions. Increasingly, competing intellectual property concerns, between universities and industry, are having a negative impact on this relationship even when software is offered at no cost (but with a license requirement).

From the industry side, the technology funding problem is even more complicated but in many ways parallels the academic model. Small companies (sole proprietorships) may have the clearest picture right now due to recent changes in Section 179 of the U.S. Internal Revenue Service rules and regulations. Over the past two years, and due to continue until at least 2006, a new provision that allows up to $100,000 of capital equipment to be expensed (depreciated) in a single year has been implemented. This is the sort of clear government policy that can greatly assist small technology companies. Unfortunately, the rationale behind the policy is probably based upon economic stimulation as opposed to long term scientific or technological goals but the benefit is still real and practical. Whether this policy goes far enough and whether similar policies can be scaled up remains an open question.

Larger companies are another unique environment and much corporate policy towards investment in technology is driven by economics of short-term profitability, which in turn is a function of tax policy. Frequently, larger companies centralize their general computing environment into an overhead cost that applies to all groups from marketing and sales to engineering. Historically, technology funding that was specialized for engineering testing and/or product development was supported in a similar fashion. After all, the company could not deliver the product unless all parts of the engineering and business operations were funded. In this way, expensive experimental facilities and other specialized technology were funded by the complete organization. Structural testing and computer aided engineering normally fall into this category. The difficulty in this approach involves justification for each technology on a productivity basis.

Increasingly, different operational functions within large companies are formed into independent cost centers with different overhead rates based upon the facilities required by each functioning unit. This essentially puts each unit in competition with other units in a productivity-based model. Since all functioning units still utilize the general computing environment (internet, personal computing, etc.), this overhead is still spread somewhat uniformly across all units. This common overhead often includes the computing needed for design, analysis and business functions. Specialized technologies, like anechoic chambers, wind tunnels, sensor calibration and various test labs are functions of testing activities and are often placed into one unit responsible for all testing. The associated overhead for such facilities is quite high, which makes the internal charge rates for this unit excessive. While this is acceptable in a theoretical productivity model, the other units quickly learn that they can add their own internal technology groups, or fund external technology groups, at a lower cost than hiring the internal test unit for many of the less demanding test requirements. Ultimately, this defeats the purpose of providing facilities and the associated expertise within the organization. As long as these technology areas are not considered core technology to the company, this approach may be acceptable – the technology is simply outsourced to an appropriate subcontractor. Maintaining sufficient expertise within the organization then becomes the ultimate concern. The long term goals of the organization may be compromised.

In both situations, the value placed upon the technology infrastructure is the basic question. Can we educate the engineers and scientists of the future without continuing access to current technology? Can we develop new products and/or maintain internal expertise without access to this technology infrastructure? There is a belief in some quarters that we are on the verge of being able to simulate just about anything with the ultimate elimination of most testing. For structural testing, I do not yet subscribe to this theory, particularly as it would apply to nonlinear systems and statistical variation. The future of structural testing technology and how it is funded depends upon the answer to these questions.

I hope this gives you something to think about as we move into the New Year. If you have thoughts on this concern, please feel free to contact me. S&V

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