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# **Forecasting Financial Priorities for Technology**

**Martin Ringle, Director  
Computing & Information Services  
Reed College**

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Martin Ringle, Director <sup>1</sup>  
Computing & Information Services  
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## Introduction

In 1943, Thomas Watson, chairman of IBM, said, "I think there is a world market for maybe five computers." Nearly forty years later, Bill Gates, founder of Microsoft, said, "...640K ought to be enough for anybody." Remarks such as these underscore a vital point: predicting the future of technology is a dangerous game, even for the most successful people in the history of computing. Unfortunately, this is the game that chief technology officers are required to play. We try to make it seem less elusive by calling it "strategic planning." Regardless of what we call it, however, it is a risky endeavor; yet as the pace of technology quickens winning the game becomes ever more critical to our institutions.

At the center of every long-range technology strategy -- beneath all the policy and procedure statements on standards, equipment, software, networking, staffing, etc. -- lies the key to success or failure: the financial model. For many institutions, however, the financial model is barely visible in their technology planning efforts. All too often, neither technology officers nor financial officers have a complete picture of how much the institution is really spending on technology nor how those dollars are being spent. Under these conditions, prioritization of funding items for technology is difficult, if not impossible.

The purpose of this paper is to look at financial models for technology and the priorities they need to address. The primary data upon which the discussion is based are drawn from trends among a reference group of twenty-five private, liberal arts colleges during the ten year period, 1986 through 1996.<sup>2</sup> In some respects, this is an update of the 1992 paper, *The Cost of Computing: Shining a Light into the Black Hole*, by David Todd and myself.<sup>3</sup>

It should be noted that while many aspects of funding, budgeting, and expense control differ substantially between private undergraduate colleges and other types of institutions, many of the observations in this paper can be applied to almost any college or university.

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<sup>1</sup> Questions and correspondence should be sent to Reed College, Portland, Oregon, 97202 or ringle@reed.edu. The Reed homepage is www.reed.edu.

<sup>2</sup> A list of the institutions and individuals who contributed data to this study is provided at the end of the paper.

<sup>3</sup> This paper appeared in *Computing Strategies in Liberal Arts Colleges*, M. Ringle, ed., MA, Addison-Wesley, Inc., 1992, pp. 69-103.

## “Simplicity, Simplicity, Simplicity!”

–Walden, Henry David Thoreau, 1854

Discussions of financial models for technology are often quite complex, especially when they focus on the maze of accounting practices that can be used to manage funding and expense control. The foundation of a good financial model for technology, however, can be understood in relatively simple terms, i.e., it must:

- be consistent with an institution’s overall priorities;
- accommodate an institution’s financial limitations;
- address technology needs as *endorsed by users*;
- and be sufficiently flexible to adapt to changes in funding, technology, staffing, management and other factors.

Institutional priorities – A common weakness of many financial models for technology is that they *assume* rather than *explain* the relationship between technology and the institution’s other priorities. Technology officers, immersed in the challenge of keeping up with skyrocketing user demand, frequently overlook the fact that senior officers are juggling funding for technology with other pressing items such as deferred maintenance, faculty and staff salaries, and financial aid. Technology officers must be able to articulate a clear understanding of how technology fits into the overall institutional strategy and what this implies for the total funding picture.

Financial limitations – An axiom of organizational funding is that there is never going to be enough to meet everyone’s needs. To be successful, a financial model for technology must be designed with sensitivity to what is possible and practicable, given an institution’s financial constraints. Models which focus exclusively on technical or user demands may fail to provide senior officers with realistic options and may not, therefore, be of much value in building a workable funding strategy. It may be necessary, however painful, to acknowledge that an institution simply *cannot afford* to provide certain technology services unless it is willing (and able) to sacrifice funding in some other area of the budget.

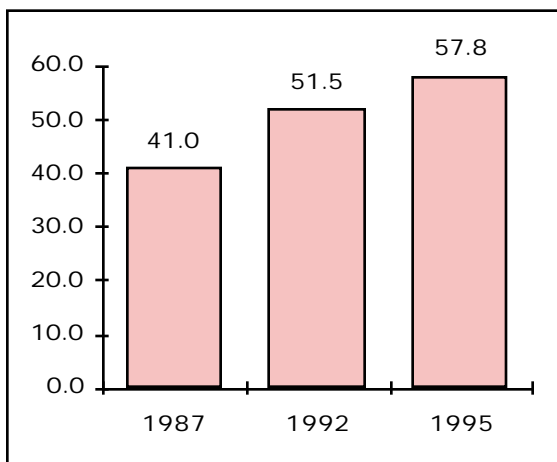
User endorsement – Technology financial planning is all too often a back-room exercise conducted by the chief technology officer, alone or with a small group of trusted colleagues. Such planning does absolutely nothing to moderate user demand nor to promote understanding of the limitations faced by the information technology organization. The more awareness that users have of IT financial constraints, the better. It is important that a financial strategy reflect, to as great a degree as possible, technology needs as perceived by users. A user endorsement of the financial plan for technology, based on an understanding of fiscal limitations, may help to garner new institutional resources while it helps -- at least temporarily -- to moderate user demand.

**Flexibility** – With changes coming so quickly and from so many different directions, it is imperative that the priorities embedded in a financial model be as flexible as possible. Winning strategies are those that make it relatively easy to modify funding sources, allocation priorities, and technology decisions, as circumstances require. In lieu of a single comprehensive, long-range technology strategy, institutions may be better off defining a set of agile and adaptive short-range strategies that fit together to form an overall plan.

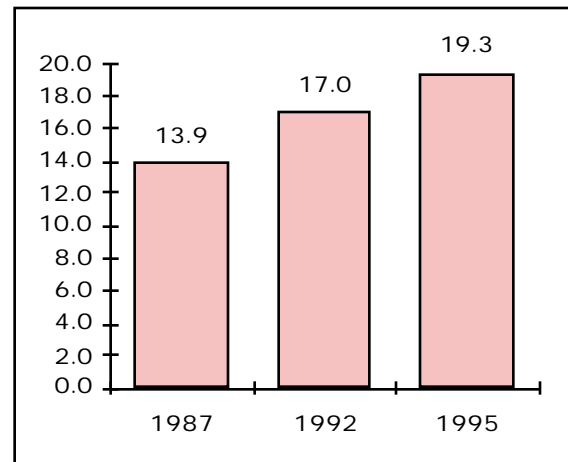
### **The Top of the List: Staffing**

The first thing that usually comes to mind when considering spending priorities for technology is equipment. Increasingly, however, budgetary emphasis for technology in higher education is being directed towards people rather than equipment. In part, this is the result of the growing realization that user satisfaction seems to correlate far more consistently with support staff than it does with hardware availability.

The increasing priority given to staffing is evidenced by the growth in the percentage of the IT budget devoted to personnel. Within the reference group of liberal arts colleges, for example, IT expenditures on staff salaries increased from 41% in academic year 1987 to nearly 58% in 1995 (Figure 1). During the same period, median staff size in the reference group grew from 13.9 to 19.3 fte (Figure 2). The two areas of staffing that experienced the greatest growth were user support and network services. Most recently, new staffing has been concentrated in the areas of web materials development and web server management.



**Percentage of IT Budget for Staff Salaries**  
**Figure 1**



**Median Staff Size (fte)**  
**Figure 2**

Despite the growth in staff size, more than 90% of the chief technology officers questioned indicated that the demands for expanded user support and more sophisticated technical services have risen more quickly than increases in staff size. To make matters worse, nearly half of the schools are seeing a reduction in staff

longevity,<sup>4</sup> and all but a few are feeling intense pressure from salary competition with the private sector. Smaller colleges, especially those located in rural or remote areas, have been very hard pressed to hire and retain qualified staff in numbers that are sufficient to meet the demand.

By all indications, recruiting and retaining high quality staff is going to become the single biggest financial challenge for IT organizations in the years ahead, despite the fact that there are more qualified people in the technology job market than ever before. What can be done to address the problem (other than simply increasing the overall IT budget)?

Allocate more funds for personnel – If the percentage of the IT budget for staffing is relatively low then it should be possible to re-allocate funds from line items such as maintenance contracts (see below). Schools that are already spending close to (or above) 70 percent of their IT budgets on personnel, however, should be very wary of increasing staffing dollars further, since this could trigger serious problems with funding for operations, equipment replacement, etc.

Help your staff improve themselves – Although salary budgets have increased substantially, funds for staff development -- workshops, seminars, conferences and the like -- have generally remained flat or have decreased during the past five years. Providing opportunities for staff to acquire new skills and take a break from daily routines can be an extremely cost-effective way to improve retention and make staff more valuable to the institution. A reasonable target for staff development funding is 3% to 4% of the total IT budget. Currently, most schools in the reference group spend between 1% and 2%.

Provide unpaid leaves – Colleges that allow IT staff to take periodic unpaid leaves often find that it helps to reduce the cost of recruiting and training new staff. Given the “burnout” conditions of so many IT jobs, a few months off every few years can be enormously rejuvenating for the staff member and cost-effective for the college.

Outsource – In the past, private colleges, especially smaller ones, had few choices with respect to IT outsourcing; it was generally an “all-or-nothing” proposition. The lower cost of “doing it yourself” generally won out. Today, there is a growing menu of “task-specific” outsourcing opportunities that range from piecemeal web development to comprehensive IT support. While there are drawbacks to outsourcing -- for example, staff loyalty is to the third-party provider rather than to the institution -- the benefits are increasing. In a fast and forbidding job market, a third-party provider may be able to deliver high quality staff with little or no disruption due to turnover. More and more small colleges, especially those outside

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<sup>4</sup> IT staff longevity at private liberal arts colleges has traditionally been higher than that of many other types of institutions, both in education and the private sector. The median for the reference group, slightly less than 5 years, continues to be comparatively high though the gap is narrowing especially in very high demand positions, such as database management, networking, etc.

of urban areas, are exploring task-specific outsourcing as a strategy for addressing recruitment and retention problems.

Distribute the cost of support staff – More and more IT organizations, even the highly centralized ones common at small colleges, are recognizing that support staff in client departments may be easier for an institution to fund than staff in the central organization. Such staff can help to ease the burden on central staff in a variety of ways. Rather than being concerned with “control,” IT organizations should focus attention on the best way to hire and deploy staff.

Restrict services – Perhaps the least attractive option for making ends meet is to reduce or eliminate existing IT services. In the long run, however, it is wiser to do a few things well than to do everything poorly. Unfortunately, many IT officers and organizations are myopic when it comes to making this choice. If financial resources are treated as a zero-sum game then technology services must be viewed likewise. (Feel free to send photocopies of this paragraph to your computing committees, your staff, and your boss(es)....)

### **Equipment Acquisition, Upgrade, and Replacement**

In 1989, Gary Augustson, Executive Director of Computing and Information Systems at Penn State University, offered a perspective on financial priorities for technology that included the following:

Probably most easily overlooked is the need to plan for replacement of equipment when it becomes obsolete. With today’s technology, the useful lifespan of equipment is...but a few years. Universities that are struggling to...fund...equipment hardly want to worry about replacing [it] in the foreseeable future.<sup>5</sup>

Little has changed since 1989, except that, as predicted, a great deal of the computing equipment on campuses is now obsolete. While colleges and universities are aware of the need for replacement strategies, relatively few have taken the necessary steps to address the problem. An informal poll of chief technology officers conducted during 1995-1996<sup>6</sup> indicated that while more than three-fourths of their institutions had established, or were in the process of establishing, policies for the regular replacement of computing equipment, fewer than a quarter of those institutions had identified or allocated sufficient funds with which to carry out those policies.<sup>7</sup> Like

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<sup>5</sup> J. G. Augustson, “Strategies for Financial Planning,” in B. Hawkins, ed., *Organizing and Managing Information Resources on Campus*, EDUCOM Strategy Series on Information Technology, 1989, 263-280.

<sup>6</sup> The poll was initiated by Reed during the Educom95 Post-Conference Workshop and pursued by e-mail in spring, 1996. There were 72 responses, mostly (but not exclusively) from liberal arts colleges.

<sup>7</sup> Within the reference group of liberal arts colleges, more than 65% have developed (or are developing) policies while only 10% are fully funded.

deferred building maintenance, this is a problem that promises to get worse as time goes on. What can we do?

Don't depend on the kindness of strangers – Grants, gifts, capital allocations, and end-of-year excess funds are NOT the way to finance equipment replacement. Do an inventory, price out a total replacement cost, divide by the preferred number of years in the replacement cycle, and then put the resulting figure -- underlined and in red -- in front of everyone: boss(es), committees, trustees, staff, and constituents. The first step in getting a realistic line item in the operating budget for equipment replacement is to do the arithmetic, and publish the results.

Take a careful look at unit cost – It used to be a truism that while the capacity of hardware increased, the unit price stayed fairly constant, somewhere between \$1,600 and \$2,000 for a typical desktop configuration. For strategic budgeting purposes, schools in the reference group used a median figure of \$2,000 per desktop for more than six years. During the past year, however, the median figure has jumped to nearly \$2,400, driven by the appetites of more sophisticated users who want high resolution monitors, removable media back-up devices, high-speed network and mobile connections, and other niceties. Can we really afford to provide such platforms? Not likely. We have to restrict the baseline unit cost and somehow limit its growth to the level of inflation.

Increase the life-cycle – A sample of schools that have equipment replacement policies reveals a median of 4 years for desktop equipment. The majority of schools endorse life cycles of 3 to 5 years, though about 20% have longer cycles (between six and ten years). A small number of schools are attempting to support cycles of less than 3 years. In the private sector, replacement policies of less than 3 years are not uncommon.

The problem with many of these “endorsed” life-cycles is that schools are not actually funding them (fully) and, in many cases, simply aren't in a position to do so, now or in the foreseeable future. Funding a 4 year replacement policy at the “50% level” (as several schools indicate they are doing) is just another way of describing an 8 year life cycle. Schools with a fully funded 8 year cycle, however, may be better off than schools with a paper policy that lacks realistic institutional support. Facing up to fiscal limitations means deciding how many years (on average) a machine can be useful for faculty, students, and staff and funding replacements at that level. If an institution can only afford a 7 year replacement cycle then it needs to acknowledge this fact, budget accordingly, and get on with the rest of its planning activities. If it determines that it simply cannot live with such a cycle, then it needs to provide sufficient cash, in the operating budget, to shorten the cycle. Period.

Tighten the perimeter – During the late eighties many schools discovered that they could get more “bang for the buck” by re-allocating used equipment. For example, Brian Hawkins and his colleagues correctly pointed out that:



The half-life of a piece of equipment in an engineering department may be only two years, whereas the half-life of that same piece of equipment in another department may be four years. Reallocation of equipment is essential for the effective utilization of technology over its life cycle.<sup>8</sup>

Nearly every school has exploited this strategy in one form or another. After a decade of reallocation, however, many schools are now finding that their installed base has grown enormously and they are financially unable to include all machines within a regular replacement policy. The only practical solution is to define a subset of the installed base -- a smaller perimeter -- that will be eligible for regular replacement. (Unfortunately, maintaining, rather than replacing machines can prove to be just as costly in the long run.)

Promote student ownership – Each year it becomes a little more practical and a lot more desirable for students to own their own computers. Networked residence halls, falling prices, and more “consumer” availability, are helping to accelerate student ownership, and institutional incentives, such as loan programs, bundled software, one-stop shopping, and convenient user support, can be applied to further increase student ownership.

To lease or not to lease – During the eighties, computer leasing became less and less attractive to colleges as desktop computing grew, the unit cost of microcomputers declined, and interest rates skyrocketed. As John Oberlin has insightfully observed, however:

Leasing has several advantages: (1) it sets a clear expectation that technology will be replaced on a regular life-cycle basis; (2) it shifts the burden of recycling to the vendor, who becomes responsible for disposition of the computers at the end of the lease; and (3) it offers the opportunity...for the institution to recapture the salvage value of old technology before it goes to zero.<sup>9</sup>

Schools that simply don't have sufficient “cash on hand” to establish an appropriate equipment replacement protocol, should look seriously at desktop computer leasing as a way of addressing the replacement problem.

Will NC Save the Day? – With everyone in higher education (and the private and public sectors as well) facing similar problems with regard to equipment replacement, the prospect of a “silver bullet” is extremely tantalizing. Will the

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<sup>8</sup> B. Hawkins, R. Weissman, and D. Wolfe, “Prescriptions for Managing Information Resources on Campus,” in B. Hawkins, ed., *Organizing and Managing Information Resources on Campus*, EDUCOM Strategy Series on Information Technology, 1989, 229-259.

<sup>9</sup> J. Oberlin, *The Financial Mythology of Information Technology: Developing a New Game Plan*, CAUSE/EFFECT, Vol. 19, No. 2, Summer 1996, 10-17.

*network computer* (NC) envisioned by Larry Ellison of Oracle -- and now heralded by Microsoft, Intel, and many others -- provide a solution that will radically alter the financial picture? Current wisdom within higher education is that it will not. As many of us recall, ten years ago it seemed as if microcomputers would have a dramatic financial advantage over mainframe technology, thanks to lower "per seat" costs. When we look at the total cost of ownership, i.e., networking, servers, software, and staffing, it is apparent that we are spending more per seat, not less. Even if the price of an NC or "thin client" falls to \$500 (or less!) the total cost per seat is going to involve additional network bandwidth and more server capacity than are required in the distributed environments currently used. Savings to institutions may be far less than expected and, if the experiences of the past fifteen years are at all relevant, they may be nil. The NC may be a winner for functional reasons but it isn't likely to help colleges and universities lower their IT budgets.

### **Maintenance Contracts**

In the eighties, maintenance contracts for centralized hardware (and system software) often consumed 25% to 35% of IT operating budgets at small colleges. Today, the amount has dropped below 10% in most cases and is continuing to decline. A significant factor in this trend has been the movement away from proprietary platforms to more competitively priced open platforms. Schools that haven't made (or completed) this evolution, and who are still spending substantial amounts on maintenance contracts, should move more quickly in this direction.

Take advantage of longer warranties – One of the better ideas to emerge from vendors lately is the three year warranty on host and server hardware.<sup>10</sup> Unlike desktop equipment, there is little to be gained by pushing centralized equipment much beyond a three year life cycle. This option allows institutions to immediately shift maintenance funds into equipment acquisition and replacement without paying the additional premium embedded in a lease or other credit arrangement.

Do it yourself – There is a perennial tug-of-war between those who favor maintenance contracts for desktop (and small server) equipment and those who provide in-house maintenance operations. Variables such as proximity to an urban retail environment and the local price of labor make a universal cost-benefit analysis impossible. It is true, however, that many schools are finding that the growing revenue from the maintenance and repair of student (and other) privately-owned equipment is sufficient to subsidize the maintenance costs for college-owned equipment. The speed, reliability, and convenience of in-house maintenance are bonuses on top of the potential financial benefit.

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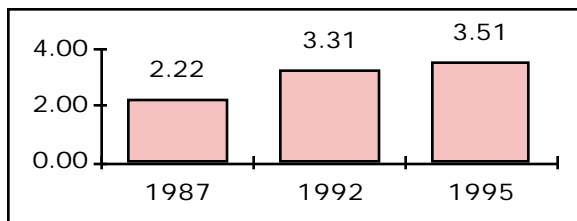
<sup>10</sup> Digital Equipment Corporation and Hewlett-Packard provide three year warranties on many, though not all, of their host/server lines. IBM provides them on PC but not on Unix platforms.

## Software

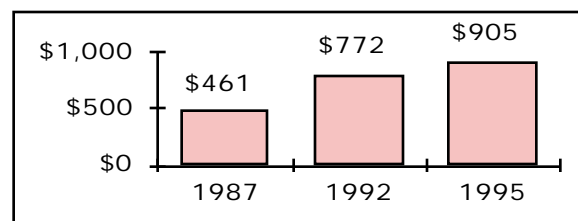
While the unit cost of software has been shrinking, the gross cost of software has been steadily rising because colleges and universities are using more packages from more sources than ever before. Much of the cost of software, however, has become hidden in departmental “supplies” budgets or other nooks and crannies of the institutional operating budget. Rather than seeking to draw these funds back into the central IT budget, it is wiser simply to endorse this trend and allow software to realize its destiny as a “consumable.” (The problems of standards and support can be addressed regardless of how software is purchased.)

## Information Technology as an Institutional Priority

There are numerous way to assess an institution’s overall priorities. One of the easiest, though perhaps not the most accurate, is to look at the percentage of the general operating budget devoted to each item. In the case of information technology, the priority has increased in the past six years. In 1989-90, the median among the reference group was 2.22%. By 1995-96 it rose to 3.51%, as illustrated in Figure 3. Technology leaders among the group are now spending 4% to 6%.



Percentage of E&G Budget for IT  
Figure 3



Dollars Per Student (UG-fte)  
Figure 4

Another metric that can be used for comparison purposes is the number of IT dollars in the institutional operating budget being spent student (i.e., undergraduate fte’s). As shown in Figure 4, the median expenditures per student among the reference group has more than doubled during the past six years.

While these numbers indicate a trend towards greater institutional emphasis on technology, they shed no light on where additional funds have come from. When asked, many technology officers confess ignorance or reply to the question by saying “the general fund.” As those who deal with the finances of colleges and universities are keenly aware, line items do not increase unless other line items decrease or new money is found. So where is the money really coming from?

Tuition and technology fees – A number of institutions appear to be directing larger portions of tuition increases into technology funding. In a few cases, private colleges and universities indicate that they have added identifiable “technology

fees” to their room, board, and other fees. For the most part, though, private liberal arts institutions have been very hesitant about creating “required” fees outside of the tuition structure since this can be interpreted by a wary clientele as a maneuver to hide the real cost of attending college.

Cost recovery (usage) fees – Six years ago, most colleges in the reference group indicated that usage fees played little or no role in their technology funding strategies. (This, of course, is one of the major differences between public and private institutions.) The situation seems to be changing. In addition to the accepted practice of charging for (laser) printing, schools are now levying charges for dormitory network access, PPP dial-in access, and specialized services such as scanning, color printing, etc. Perhaps the most substantial area of usage fees has been telecommunications where revenues from long-distance services, voicemail, and so forth have been used to underwrite networking and other operating costs.

The area with the greatest untapped potential is usage-based Internet access. Currently, most colleges charge flat fees for residence hall network connections. As institutional costs rise, however, colleges may begin to treat Internet access the same way they treat long-distance telephone services, with connect time charges rather than flat fees.

One-time sources – A surprisingly large number of institutions still rely heavily on one-time funding sources, including capital allocations, discretionary funds, gifts, and grants, to subsidize operational increases in technology support. Though the strategy is frequently described as an “interim” approach, data collected during the past ten years suggests that some institutions have made little or no progress in the direction of moving key operational costs for technology to stable operational funding sources.

The most problematic one-time funding sources are equipment grants. Unless long-term funding (or a long-term funding strategy) is built into the original grant, the equipment quickly becomes an albatross around the neck of the IT operating budget. Private foundations and public funding agencies have begun to acknowledge this fact and many are eliminating grants for equipment altogether or requiring that detailed long-term financial commitments be delineated as part of a grant proposal.

Organizational changes – Another major factor in funding source modification, especially during the past four years, has been increased integration among various technology and information resource organizations. More and more colleges are bringing telecommunications, instructional media, and other services together with computing, networking, and distance education. Most recently, integration of the library with these other services has also increased. For example, in 1989 none of the schools in the reference group had an organization that embraced both technology and libraries; nearly 12% of the schools have now moved to this type of organization. Whether this becomes a trend -- and whether it ultimately helps to improve the funding picture -- remains to be seen.

Other line items – This is perhaps the most common source of technology funding increases. For obvious (political) reasons, few colleges have been willing to discuss strategies for technology funding that involve reductions of other budget line items. (One school, for example, insisted that it doesn't transfer funds from one line to another; it simply *reduces* allocations in one line, *moves* the residual to the general fund, and then *increases* funding in a different line. Hmmm?)

## **The Bottom Line**

While it may be impossible to predict the next wave of technological innovation or the precise curve for the growth of user demand, institutions must develop financial strategies for technology which define flexible priorities and which fit into their overall mission and financial structure. As Gary Augustson correctly points out: “There is no simple prescription for success, and what works at one institution may not work at another. Nothing, however, can beat enlightened leadership.”<sup>11</sup> It is incumbent on chief technology officers, working closely with senior officers, advisory committees, and other members of the college community, to develop a comprehensive understanding of what the institution is trying to accomplish with technology, how priorities for services and infrastructure relate to one another, where funding will be found, and of greatest importance, how much technology the institution can actually afford without harming other critical funding priorities.

## **Acknowledgments**

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<sup>11</sup> J. G. Augustson, op. cit., p 278.