

# 7

# Benchmarks

## for Information Technology Investments

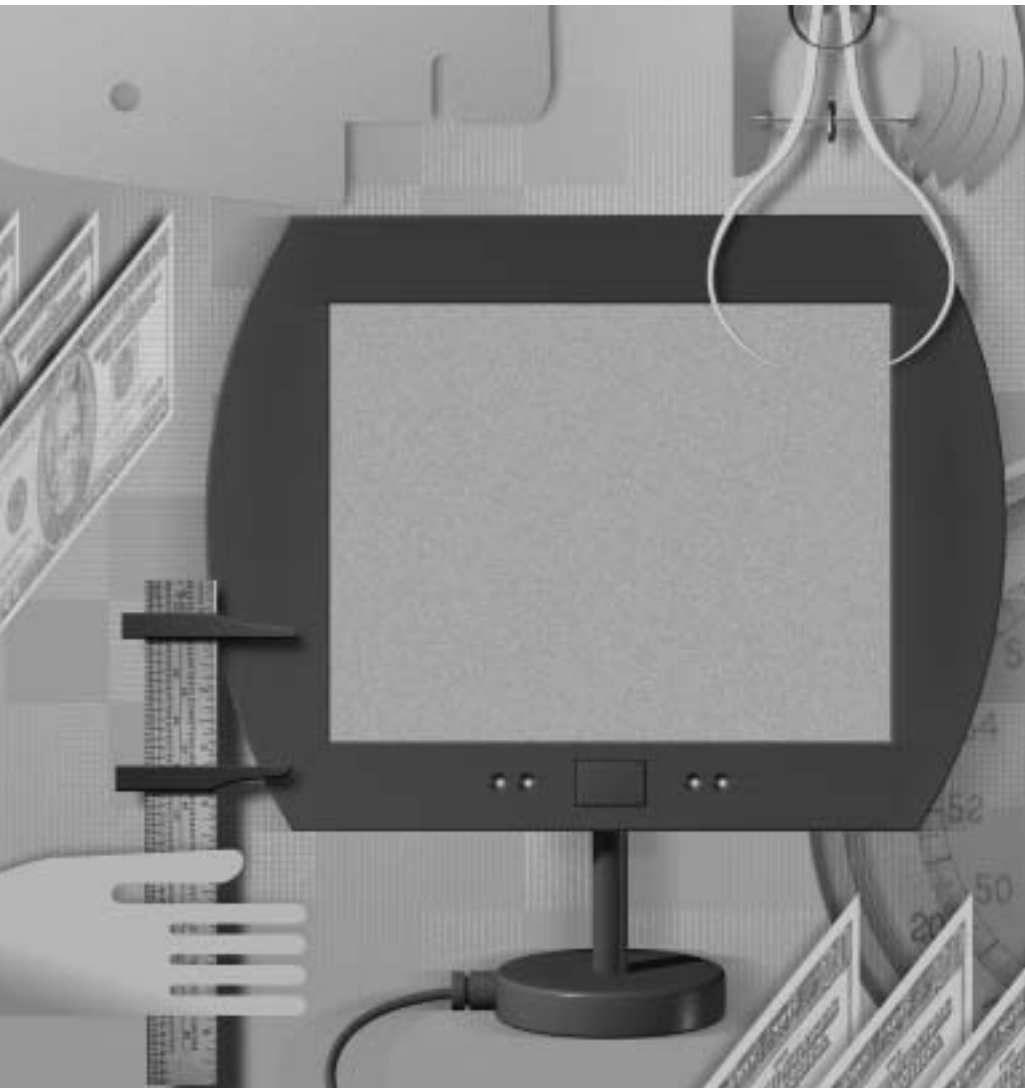
Spending benchmarks help campuses evaluate their efforts in supplying IT services

By **David Smallen** and **Karen Leach**

In 1980, Richard Van Horn, Provost of Carnegie Mellon University, led a discussion at the Snowmass Seminar on Academic Computing about the relationship between investments in technology and institutional academic goals.<sup>1</sup> Twenty years after Van Horn raised this question, trustees, presidents, and chief financial officers ask similar questions about *all* their information technology (IT) investments, not just those related to academic goals.

IT budgets continue to grow faster than other parts of the institutional budget and crowd other strategic objectives at almost every institution. Recent economic changes will put additional pressure on college and university budgets. The challenge remains — to develop cost-effective approaches to delivering services and providing secure and reliable infrastructure. IT leaders will work to align their organizations and services even more tightly with institutional priorities and to carefully understand their spending on IT. This article highlights seven benchmarks identified and tracked through the COSTS project<sup>2</sup> that promote understanding of IT investments.

The COSTS project is an ongoing effort to examine current budgeting and spending on IT, including longer-term



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trends. Of the 125 colleges and universities currently participating in COSTS, 101 submitted data for the past two years. Each year participants in the project complete a survey that covers the full institutional cost of supplying IT services to their college or university. There is no fee to participate in the COSTS project. Only institutions that submit data receive the full results. The complete data set is rich with potential comparative data.

There are no absolute measures of how much an institution must, or should, invest in support of IT. The level of investment should reflect how IT supports institutional priorities and the priority given to technology by the specific institution. IT investment is also related to the fundamental type of institution. For example, we consistently see that smaller schools with more staffing and more resources invest in more technology and more technology support. Comparisons of the benchmarks with similar institutions — especially ones with which your institution competes for students and faculty — can be revealing. The seven core benchmarks are ratios made up of basic IT-related data and institutional demographic data.

For this analysis we divided the data in the study by institutional type using common Carnegie Classifications.<sup>3</sup> Institutions labeled B1 are small liberal arts colleges that are highly selective in admissions and that offer more than 40 percent of bachelors degrees in traditional liberal arts disciplines. These institutions tend to charge higher tuition and have access to more financial resources, for example, through earnings of their endowments.

The institutions labeled B2 are liberal arts colleges that are less selective in admissions or that offer less than 40 percent of bachelors degrees in traditional liberal arts disciplines, offering more specialized degrees — for example, in business. These institutions generally charge lower tuition and have smaller endowments and student body sizes.

The masters institutions, labeled M12 (the combination of the institutions with Carnegie Classifications M1 and M2), offer a full range of undergraduate and

graduate degrees with at least 20 master's degrees offered each year. They tend to be larger than the liberal arts colleges.

Note, figures illustrating the benchmarks include data from 2000 and 2001.

## Why (These) Benchmarks?

Finding effective ways to understand IT budgets and develop meaningful comparative data among peer institutions has been a goal of the COSTS project from the beginning. Consistent with this goal, "Benchmarking is an effective and systematic discipline of searching for new ideas and learning from others. ... Benchmarking is an active strategy of gaining information to enhance performance, which in turn improves efficiency and effectiveness and leads to a more competitive position."<sup>4</sup>

We looked for measures that

- could be compared across institutions,
- would shed light on budgeting and staffing for IT,
- could be normalized for institutional size and resources, and
- would be similar to benchmarks commonly used by institutional leaders in non-IT areas.

The resulting seven benchmarks are the first of what we assume will be a more comprehensive collection of valuable comparative measures. Their full value

will be determined with use over time.

Note that these benchmarks focus on quantity rather than quality measures. While we feel that a relationship often exists between quantity and quality measures, that is not the focus of the COSTS project, nor is such a relationship derivable from the data we collect.

## Benchmarks

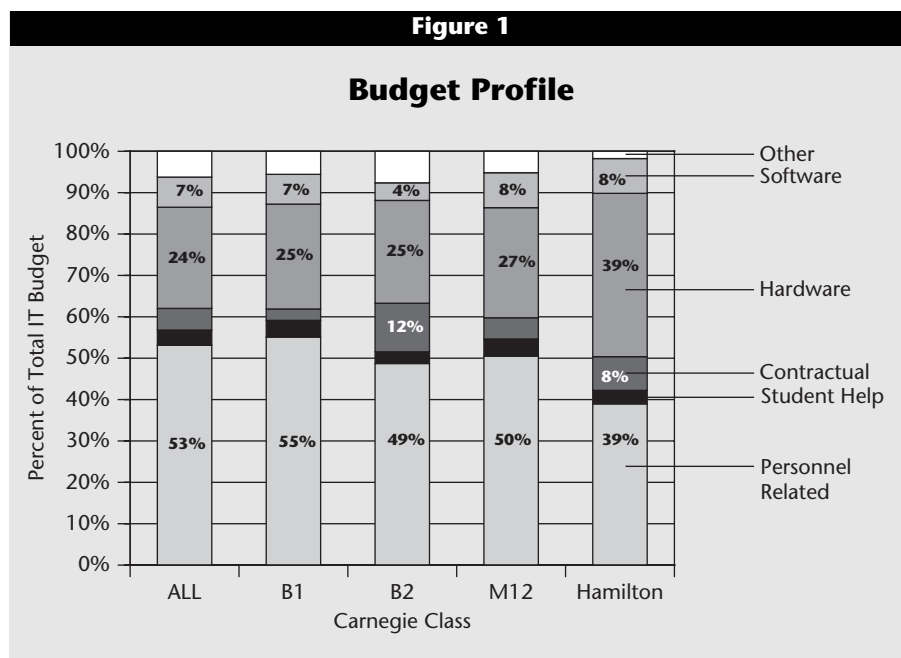
The first three benchmarks help understand the IT budget. The next three provide insight into staffing levels and emphases. The seventh benchmark relates to the pervasiveness of institutional infrastructure.

### 1. Budget Profile

Budget Profile shows how IT dollars are allocated across common institutional budget classifications such as equipment, software, student wages, and so forth. Differences among institutions indicate different emphases for IT deployment and/or different management of IT resources.

Figure 1 shows the budget profile for all 101 COSTS colleges and universities that submitted data for both of the most recent two years (2000 and 2001), summarized by the three Carnegie classifications.

The conclusions that can be derived from benchmark 1 include the following:



- Among all institutions approximately 50 percent of the IT budget is related to personnel costs, including salaries, benefits, and staff development.
- Among smaller institutions (B2) with fewer financial resources, more of their budgets are directed at contractual (outsourcing) types of arrangements (12 percent).
- Across all institutional types the percentage of IT spending devoted to hardware (25 percent) and software (7 percent) is roughly the same.

The data show that even though the sizes and missions of the schools differ, the general distribution of resources is similar. Only the B2 institutions, which are presumably more pressed for efficient use of resources, spend less on software. This may indicate a higher degree of standardization or a narrower range of computing capability. B2s may also be outsourcing services more often to retain more budget flexibility. One can surmise that institutions with more budget stability prefer in-house staffing based on the belief that they provide higher quality service.

Note that there were not enough public institutions among the COSTS participants to do any meaningful public-versus-private comparisons for any of the benchmarks. Given differences in institutional financing strategies for public and private institutions, it is likely that there might be differences in budgeting strategies for IT as well.

The COSTS project aims to help IT and financial managers understand more about individual institutions compared to trends in the industry. At the same time, variations from the typical picture may be perfectly appropriate. For example, Figure 1 includes a sample of data for Hamilton College (a B1 institution). The proportion of funds Hamilton spends on hardware (40 percent) is considerably larger than our peers, probably because of our fully funded replacement plans for desktop computers, central servers, data projectors, and network electronics. We believe these replacement plans are essential to long-term financial stability and result in more consistent spending as well as a more level operating budget over time. In 2000

our percentage spent on hardware was 32 percent, but in 2001 we did the five-year update of our network electronics, resulting in the bump in percentage.

Also note from the Budget Profile benchmark that Hamilton does considerable outsourcing (8 percent) compared with other B1 schools (3 percent). This is most likely because our computer repair services are fully outsourced, and we rely heavily on outside organizations for high-level technology support, a strategy that in our case provides better service and saves money.

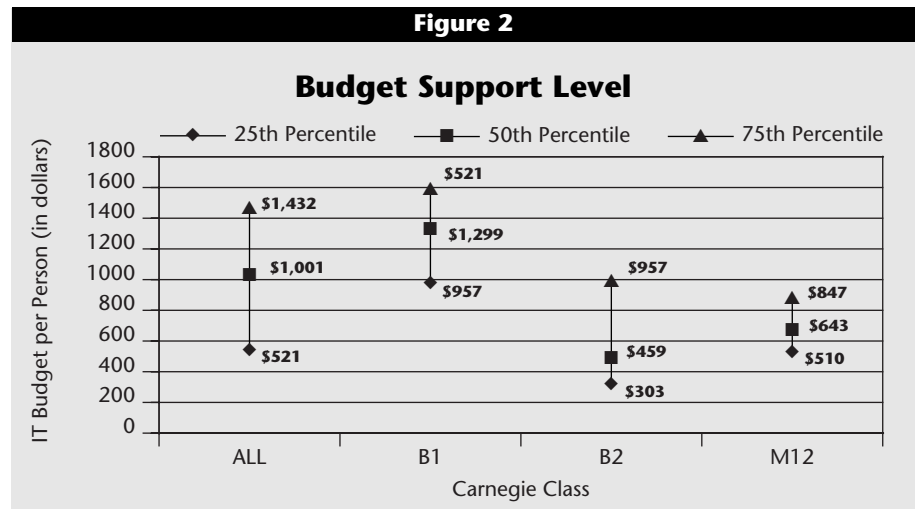
## 2. Budget Support Level

Budget Support Level attempts to further improve comparisons by normalizing for institutional size. Total budgets for IT are divided by the number of people supported. We call this the “campus population.” We use the campus population headcount because it most closely represents the full census of users requiring support for IT endeavors. It includes the total headcount of employees plus students. By “employees” we mean all individuals (faculty and staff) on the college payroll. Figure 2 shows the Budget Support Level in 2000 and 2001, based on the typical (middle 50 percent) range. Each bar on the graph represents the middle 50 percent of the benchmark value for the particular Carnegie class, that is, the values ranging between the 25th and 75th percentiles. Three values are shown on each bar: the 25th, 50th (median), and 75th percentiles. We call this the typical range for a benchmark.

The budget support level per technology user varies widely for different types of institutions. The highest allocation per member of the campus population is in the B1 category, and the lowest is in the B2 category. The difference between the B1 and B2 categories probably reflects substantially different investments in IT based largely on available institutional resources.

B1 allocations also outstrip M12 institutions. The typical budgeting at M12s falls in a considerably narrower band, indicating less variability among these institutions. These differences between B1 and M12 institutions are most likely a combination of institutional resources and economies of scale related to institutional size. Providing a service has certain fixed costs even if the campus population is small. Large institutions can use each dollar more effectively to serve more users. This is reflected in lower costs per campus member. B1 institutions have more hardware per person, reflecting their general commitment to a mission of personal attention. The culture might also differ at larger institutions, where computer users may expect less support from the IT organization, translating into lower costs per user.

Budget support for IT continues to grow. For all categories of colleges and universities we have seen growth in the budget support level between 1999/2000 and 2000/2001. The median increase is 11 percent, with the middle 50 percent ranging from 2.1 percent to 24.9 percent.



### 3. Budget Impact

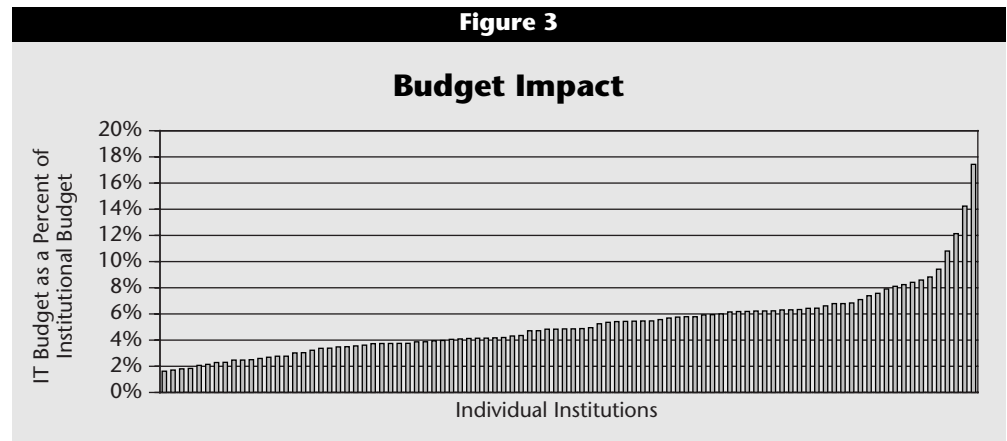
Budget Impact is the ratio of total IT budget to total institutional budget. This benchmark is one measure of the relative impact that technology has on the development of the institutional budget and long-term planning for the school. Budget figures are not a perfect measure because different schools include different components in their total reported budget amounts.<sup>5</sup> In the future we will look at actual expenditure data from audited financial statements. These figures are likely to be more standard. Even so, tracking the reported budget data over time does provide a measure of the growth in technology expense relative to other planning areas and indicates the growing impact of IT budgets on college budgets in general.

The median allocation in 2000 and 2001 for IT for all institutions is 4.9 percent of the institutional budget (see Figure 3). There is a considerable range among the 94 institutions that reported complete data for both years, with a couple of schools under 2 percent and one as high as 17 percent. The outliers should undoubtedly be more closely examined, but the middle 50 percent is likely to be meaningful. The typical range is between 3.6 percent and 6.2 percent. The breadth of variation might indicate that schools vary in their emphasis on the use of technology in the educational process. It also might indicate variation in community expectations, training, student readiness, efficiency of operations, or quality of service.

### 4. People Supported per IT Staff Member

People Supported per IT Staff Member provides a benchmark for the level of IT support services that can be delivered. Figure 4 shows how many people each IT person supported in 2000 and 2001, calculated as the campus population divided by the number of IT staff and showing the middle (50 percent) range.

Each IT staff member at larger institutions, the M12s, supports twice the number of users as are supported at B1 institutions. The median support level at B2s is 160 percent higher than B1s and 33 percent higher than M12s. Here again we can speculate that B2 institutions are more efficient or have lower user expectations.



B1s, consistent with the lowest student/faculty ratios and the highest spending rate per student in general, may also have higher user expectations and therefore provide a higher level of service. Higher support levels in the M12s are undoubtedly another appearance of economies of scale or perhaps reflect a community that is more technologically savvy.

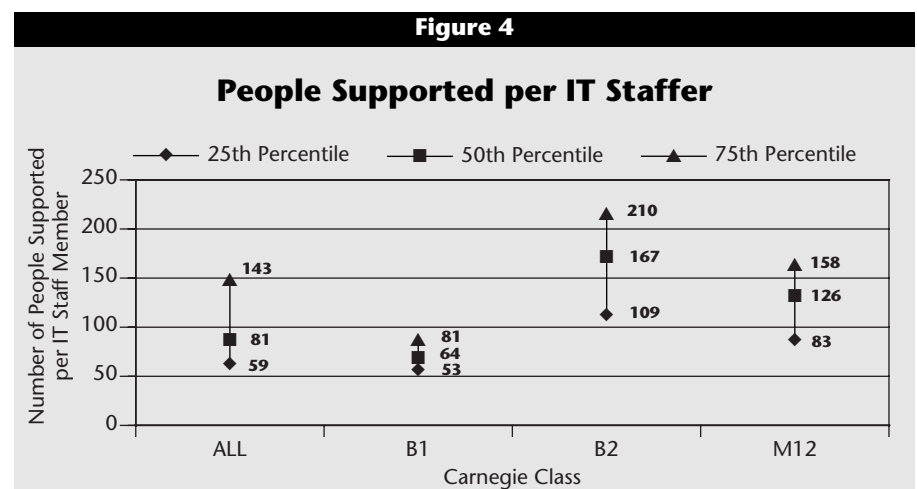
We believe that in many technology areas having additional support staff makes it possible to deliver more personal and timely service. Higher staff levels are reflected in lower values for benchmark 4. Having additional help desk staff, for example, should shorten the time to solve problems for employees and students. Additional installation and repair staff should similarly shorten the time for equipment repair or software upgrades. Having effective organizational structures and service delivery approaches, highly skilled staff with strong service ethics, and regular feedback mechanisms from clients for improvement can make any service

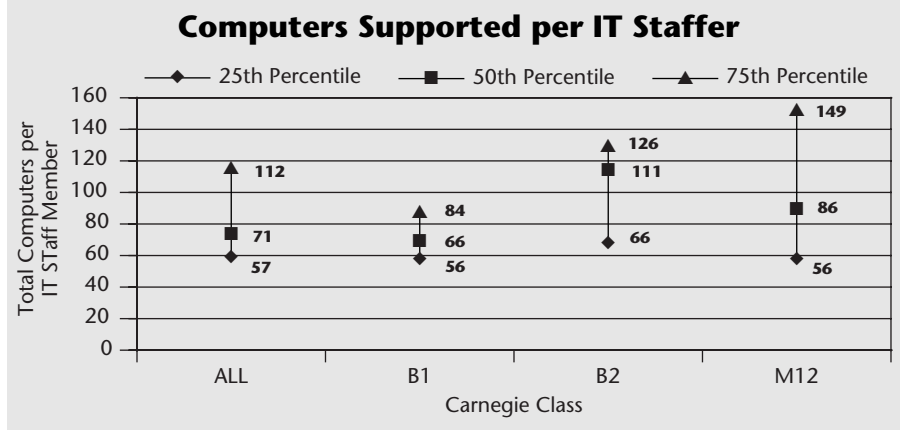
area better. In contrast, an inadequate number of support staff can almost assure that services will be unacceptable. The likelihood of successful delivery of IT services is inversely related to benchmark 5.

### 5. Computers Supported per IT Staff Member

Some schools have more equipment per capita than others. The total number of computers definitely affects the IT workload. Benchmark 5, Computers Supported per IT Staff Member, relates the total population of computers on campus (both institutional and individual) to the total IT support staff. Figure 5 shows the number of computers supported per IT staff member in 2000 and 2001, based on the typical (middle 50 percent) range. Again, we see that higher support loads occur in the small institutions with limited resources, while the lowest support levels appear in the B1 institutions.

Support needs vary significantly by institutional type. Institutions with substantial



**Figure 5**

investments in computers (for example, on faculty and staff desks and in computer labs) can often take advantage of hardware and software standards to simplify the support environment. Even the support needs for student-owned computers in a residential college can be simplified by using standardized network cards, software suites, and recommended operating systems. For institutions with significant commuter populations the support needs might be more complex, and the ability to standardize hardware and software may not be realistic. We therefore believe that the most relevant use of these benchmarks is to compare institutions with similar missions, size, and resources.

Further, economies of scale work in favor of larger institutions. For example, providing effective network services for any moderate-sized network (more than 1,000 nodes) depends on access to staff having expertise in server administration, network electronics, security, and other hardware and software issues. But, having a core group of staff with this expertise and a commitment to cross-training enables the same size staff to support a much larger network (greater than 5,000 nodes). Further, with a core professional staff, student help can be used more effectively to further increase the quality and quantity of services provided.

### 6. Staffing Profile by Service Area

The Staffing Profile by Service Area indicates how staff members are distributed among core services. The decentralized nature of technology on college campuses has resulted in a variety of sup-

port models. Comparisons across institutions may help identify efficiency or creativity in delivering a particular service.

The COSTS data collection process identifies 10 service areas, and consistent definitions are provided for each one. Institutions are asked to report full-time and student staff, both in the central IT organization and distributed in other departments. Each student is counted in proportion to the number of hours worked, with 40 hours per week assumed to be equivalent to one full-time employee. The goal is to capture the complete institution-wide staffing picture.

Figure 6 shows the average staffing levels in 2000 and 2001 broken down for each of the 10 services. The first two categories at the bottom of the chart represent investments in college information systems (administrative information systems and the Web). The top two categories represent investments in instructional support (curricular and student). All the others together can be thought of as investments in sustaining the existing IT infrastructure environment.

For all institutions the staff devoted to IT support are roughly divided as 25 percent for teaching and learning, 50 percent to run the existing environment, and 25 percent for information systems. The largest proportion of IT staff devoted to instructional support occurs in the B1 and M12 categories.

Larger institutions continue to reap the advantage of size when it comes to supporting technology with their staff. M12s invest the smallest percentage of staff on running the infrastructure, probably

reflecting economies of scale and the efficiency of supporting more users on the same network, plus a more expansive bank of similar equipment.

In this case we again show Hamilton College data as an example for analysis. At Hamilton our investment in instructional support is 40 percent — consistent with our focus on the teaching and learning environment. It is also useful to know that our investment of staff in this area is considerably higher than the B1 group.

Inter-institutional comparisons for Staffing Profile by Service Area must take into account differing institutional priorities. Liberal arts colleges, with their emphasis on teaching, can be expected to devote a greater percentage of their staff effort to supporting faculty and students. Also, faculty demands for support will be higher in institutions that have higher expectations for the research and teaching performance of their faculty. Research universities would likely have a greater percentage of their effort in technical support staff for advanced uses of computing connected with research. Institutions that have made the development of information literacy a priority will likely make more investments in staff-related training and in supporting students.

Recent efforts among all institutions to upgrade their central information systems and make information Web-accessible will likely lead to a greater emphasis in the service staff profile for supporting information systems. Again, larger institutions will be able to take advantage of economies of scale in the development of information systems. In general, it is important to compare the COSTS benchmarks across peers or similar institutions to discern differences.

The service staff profile should be viewed as a broad indicator of institutional priorities. However, allocations in one service area may be related to those in another. For example, additional training staff, along with an institutional commitment to professional development of staff, can raise the level of understanding among employees and decrease the need for help services. A properly designed and supported campus network can reduce the complexity of using the network, reducing calls to the help desk or the need for training.

**Figure 6****Staffing Profile by Service Area**

Service Areas	Percent of IT Staffing Allocated to Service				
	All	B1	B2	M12	Hamilton
Student support	15%	13%	14%	21%	25%
Curricular support	9%	10%	4%	9%	15%
Other	5%	4%	4%	8%	0%
Administration and planning	7%	8%	8%	6%	8%
Network support	10%	10%	12%	8%	11%
Hardware/software	8%	8%	9%	6%	4%
Training	3%	3%	4%	2%	3%
Desktop computer repair	7%	7%	12%	6%	0%
Helpline	10%	10%	9%	10%	13%
Web support	8%	7%	11%	7%	8%
Administrative Information Systems	17%	18%	13%	16%	12%

**7. Computer Availability**

The last COSTS benchmark measures institutional investments in infrastructure, particularly those in desktop and laptop computers. Computer Availability is the ratio of the total campus population to the number of institutional computers. This provides a rough measure of the availability of computing resources at the institution. The availability of institutional computers is likely a reflection of institutional mission and strategic direction.

Figure 7 shows the number of computers available per person in the typical range in 2000 and 2001. The B1 institutions have substantially larger investments in computers than the other categories of institutions. The typical availability ranges from one computer for every two members of the campus population to one computer for every three members of the campus population. Institutional computers are roughly 150 percent more available at B1 institutions than at institutions with other Carnegie classifications. Since B1s are primarily residential colleges, this phenomenon probably reflects the availability of specialized department labs and specialized public facilities such as multimedia centers. Institutions that have more financial resources can make access easier.

Institutions with differing priorities or missions will likely invest differently in institutional computers. For example,

community colleges, with large commuting or part-time student populations, might make larger investments in computers in public labs to best serve their populations. Ubiquitous computing institutions, ones in which all students are required to purchase their own computers, might have a much smaller investment in institutional computers in public or department labs. Again, comparisons with institutions with similar priorities will likely be most enlightening.

**Conclusion**

The COSTS project has identified seven benchmarks that institutions can use to better understand their IT investments. Taken together, over time these benchmarks provide an effective way to begin to explore questions about current IT

spending and staffing strategies and lead to efficient uses of institutional resources. Ultimately, as Richard Van Horn suggested 20 years ago, investing in IT is an institutional strategy that needs to be aligned with institutional goals. By benchmarking IT investments among institutions with similar missions, IT leaders can gain insight into how best to optimize these investments. That insight can provide answers for trustees and senior administrators as they plan their institution's overall investments. *e*

**Endnotes**

1. R. Van Horn, "Academic Computing: How Much Is Enough?" presented at the Seminar for Academic Computing Services, Snowmass, Co., August 4, 1980.
2. "Cost Of Supporting Technology Services," <<http://www.costsproject.org>>.
3. The Carnegie Classification identifies institutions based on their degree-granting activities.
4. M. H. Qayoumi, *Benchmarking and Organizational Change* (Alexandria, Va.: APPA, 2000, p. 3).
5. For example, some schools include scholarships as an item in their budget, and other schools treat financial aid as a deduction against tuition revenues. This difference can cause significant differences in the size of the budget. On the other hand, audited financial statements uniformly treat scholarships as a deduction (or allowance) against tuition revenue.

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**Figure 7**