Information Technology Benchmarks

A Practical Guide for College and University Presidents

By David Smallen and Karen Leach

The Council of Independent Colleges

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This paper has been prepared as part of CIC's Information Technology Advisory Service for independent colleges and universities. The service, established in response to a number of presidential requests, seeks to provide presidents and other institutional leaders with access to information, usually data-based and comparative, that can contribute to decisions about the purchase, lease, and utilization of information technology.

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The ***Council of Independent Colleges*** *is an association of more than 540 independent colleges and universities, including liberal arts, comprehensive, and international institutions as well as higher education affiliates and organizations that work together to strengthen college and university leadership, sustain high-quality education, and enhance private higher education's contributions to society. To fulfill this mission, CIC provides its members with skills, tools, and knowledge that address aspects of leadership, financial management and performance, academic quality, and institutional visibility.*

Information Technology Benchmarks

Information technologies (IT) continue to grow in importance for independent colleges and universities. Increasingly, students simply assume a digital world—from online application and registration, to course materials, to communicating with classmates and professors. To stay competitive for students as well as to enhance instructional and administrative effectiveness and efficiency, institutions have developed increasingly sophisticated IT infrastructures. These infrastructures place seemingly unrelenting demands on institutional financial resources—and therefore on presidents—to weigh these budget requests against a range of equally compelling expenditures, including financial aid, plant maintenance, and faculty and staff compensation.

What help is available to presidents in making decisions about IT? This paper responds to requests from presidents for assistance in approaching these issues.

The paper is organized according to five questions:

- How much IT is enough?
- Which IT infrastructure should be provided?
- How should enterprise systems be designed?
- How should users be supported?
- How does IT contribute to competitive advantage?

Within these five sections, the paper presents benchmarks that can be used to compare a given institution with similar colleges or universities and raises specific questions that are important for institutional leaders to consider.

The paper highlights six benchmarks:

1. Budget Impact (page 3)
2. Budget Support Level (page 4)
3. Budget Profile (page 6)
4. Staff Service Profile (page 7)
5. Computer Availability (page 9)
6. Staff Support Level (page 16)

Each benchmark is a ratio or budget percentage that allows a college to compare itself with peer institutions and thereby gain a better understanding of financial choices. The paper presents and discusses the use of each benchmark, and Appendix A gives a detailed description of all six benchmarks.

Use of the benchmarks depends on the availability of relevant data. Recently, several important data sets have become available. The paper makes extensive use of one set, the Cost Of Supporting Technology Services (COSTS) Project, now in its fifth year of data collection. Presidents and their colleagues can use the existing COSTS data presented in this paper to make immediate comparisons within Carnegie Classification categories. These data are based on information from 90 participating institutions, and are provided for three separate Carnegie Classifications: Baccalaureate-General, Baccalaureate-Liberal Arts, and Masters (I and II combined). Appendix B provides a breakdown of the participating institutions by Carnegie Classification. The blue text labeled "Carnegie Classification" throughout the paper suggests ways to use the COSTS data reported in tables for such comparative analyses.

It is important to note that the COSTS Project uses budgeted (rather than actual expense) dollar amounts. Also, the COSTS benchmarks utilize ranges of values in addition to averages. Presidents should therefore focus on the middle 50 percent range (from the 25th to 75th percentile, referred to in the paper as the "typical range") as a way to understand the variation among institutions. That is, benchmarks that fall outside this typical benchmark range can indicate areas for further study, particular efficiencies, or special emphases of an individual institution's use of technology.

The paper also provides a detailed example (using the authors' own institution, Hamilton College) of even more nuanced comparisons that can be made by an institution that has elected to participate in the COSTS Project. The examples using Hamilton can be found in color boxes labeled "Peer Comparisons" throughout the paper, and Appendix C presents a complete comparative analysis for the College. Another data set that can be used is EDUCAUSE's Core Data Service (CDS), which also allows participating institutions to select a group of peer institutions. The data elements in COSTS and the CDS are similar, the main difference being that COSTS uses budgeted issues, while the Core Data Service uses actual expenditures. Information about ways that institutions can participate in COSTS and/or the CDS can be found in Appendix D.

How Much IT Is Enough?

The question of how much an institution should invest in information technology has been on the minds of senior administrators for more than 20 years.[1] The most common answer has been: "It depends." But on what? Institutional mission and competitive position are two variables cited in the literature.

Indeed, there are institutions that have sought to distinguish themselves in their use of IT through major investments in infrastructure or applications consistent with their academic programs. However, the amount an institution should invest should not be driven by the technology itself. Some institutions have gained temporary notoriety through the early adoption of a new technology. Institutional funding strategies that depend on the particular technologies of the moment will be hard to sustain. In the end, long-term success will hinge on imaginative use of technology, not technology itself.

In the last 20 years, a basic level of technology infrastructure and services has become essential to the operations of all institutions of higher education. It is the funding level needed to sustain these IT elements, once they exist, that presidents must understand first. To do this, two IT benchmarks are key: the Budget Impact and the Budget Support Level.

The Budget Impact ratio is simply the percentage of the institutional budget devoted to all things that support computing and networking (for consistency in the COSTS Project, telephone and audio-visual services were not included in the IT budget). The Budget Impact provides a rough measure of the relative importance an institution places on its IT environment compared with other institutional considerations. Institutions that are outside the typical range show relatively more or less of an emphasis on the use of IT.

This benchmark is consistent across all Carnegie Classifications (see Table 1) with a typical range of 4–6 percent. For college presidents, this provides a starting place for understanding their own allocations for IT. If the calculation of Budget Impact for an institution is outside the typical range, then this might signal that further analysis of institutional strategies is in order.

Benchmark #1

$$\text{Budget Impact} = \frac{\text{Total Institutional Budget for IT}}{\text{Total Institutional Budget Net of Financial Aid}} \times 100\%$$

Table 1. Budget Impact

Carnegie Classification[2]	25th Percentile	50th Percentile	75th Percentile
BG	3.6%	4.0%	5.8%
BLA	3.5	4.8	5.6
Masters	4.3	5.1	6.1

Of course, the nominal sizes of institutional budgets for private institutions vary significantly due to such factors as total fees charged, financial aid discount rate, size of endowment, number of students, and number of employees. This will result in different absolute numbers for the size of the IT budget, but it is a starting place for understanding the question of how large IT investments should be.

PEER COMPARISON: *Hamilton's budget impact for FY 2002 was 5.5 percent, in the typical range, and slightly below the mean for its peers. It is also important to consider trends in this benchmark over several years. In a particular year, the budget impact can vary significantly from the previous year if the institution undertakes major changes in its IT environment. In FY 2001, for example, Hamilton completed a scheduled five-year upgrade of its network at a cost of $500,000. Looking at trends over time, therefore, provides a more consistent way to do benchmarking.*

To provide a second perspective on the total IT funding level, it is useful to look at the per capita budgets for IT—that is, the Budget Support Level.

This is a measure of the total IT dollars budgeted per member of the campus population. Clearly, it is a rough measure, since not all members of the campus population use technology to the same degree. Headcount is used rather than full-time-equivalent, because the technology support needs of a person do not appear to be proportional to the individual's full-time work responsibilities, but rather a function of his or her being part of the technology environment. So, for example, it can happen that the support needs for a part-time faculty or staff member may be more than those of a full-time faculty or staff member depending upon the relative knowledge of technology and the personal and professional goals the person has for its use. As illustrated in Table 2, this benchmark varies considerably by the Carnegie Classification of the institution, reflecting differing institutional missions, cultures, resources, staffing levels, and strategies.

BENCHMARK #2

$$\text{Budget Support Level} = \frac{\text{Total Institutional Budget for IT}}{\text{Total Headcount Employees + Students}}$$

TABLE 2. BUDGET SUPPORT LEVEL

Carnegie Classification	25th Percentile	50th Percentile	75th Percentile
BG	$ 465	$ 523	$ 766
BLA	1,029	1,235	1,571
Masters	532	740	836

It is well known that many BLA institutions—which usually charge substantially higher tuition and fees, have larger endowments, lower student/faculty ratios, more support staff, bigger annual fundraising efforts, and more costly physical plants—also spend more per student on non-IT budget items than BG or Masters institutions. BLA institutions also have higher research expectations for their faculty members and lower teaching loads.

If, for example, you are a president of a BG or Masters institution trying to understand the cost of providing IT services, Table 2 suggests you are operating in a fundamentally different financial arena with respect to IT than the BLA institutions. Is it really true that the qualitative nature of IT services is reflected in the dramatically different per capita allocations? Or do these differences reflect strategic emphases? Is the definition of what is "acceptable" as a service so closely linked to institutional culture that budget levels are irrelevant when comparing across dissimilar institutional types? These issues will be examined more closely in the next two sections that analyze what other benchmarks tell us about how infrastructure and services might be provided.

PEER COMPARISON: *Hamilton's Budget Support Level for FY 2002 was $1,601, in the second quartile of its peer group. It should be noted that the ten peer institutions had total headcounts of employees plus students ranging approximately from 2,300 to 3,500. While this benchmark can be compared across institutions of all sizes, small institutions tend to exhibit larger per capita costs when compared with institutions of significantly larger size, due to the lack of economies of scale. Hence, in doing peer comparisons, it is helpful to compare first with institutions of similar size.*

CARNEGIE CLASSIFICATION COMPARISON: *Estimate the Budget Impact and Budget Support Level for your institution and compare them with the FY 2002 benchmarks for your Carnegie Classification. If your institution falls in the top 25 percent, are there IT emphases that suggest a distinctive program in this level of budget? If your institution falls in the bottom 25 percent, are there particular examples of innovative strategies for delivering IT services or infrastructure at your institution?*

Which IT Infrastructure Should Be Provided?

The main components of a campus IT infrastructure are:

- a campus data network connected to the Internet,
- access to information resources and services, and
- capable desktop/laptop computing environments.

Determining a cost-effective strategy for creating and maintaining this IT infrastructure is the first decision that an institution must make. If done well, many options for providing services become available; if done poorly, institutions will be forever stuck in catch-up mode. Without a supportable IT infrastructure, the institution cannot realistically hope to provide effective or efficient IT services.

The three key interrelated IT infrastructure decisions that the institution must make are:

- ***Schedule.*** On what schedule will the infrastructure be funded for replacement?
- ***Standards.*** Which infrastructure standards will be adopted to enhance the quality of support and promote efficiency?
- ***Sourcing.*** Which infrastructure services will be provided in-house and which can be outsourced?

Decisions in each of these areas have an impact on the others and the overall quality and supportability of the infrastructure. For example, choosing a standard hardware and software environment for the desktop and one vendor/distributor to provide each of the components can lower the service costs, make an outsourcing arrangement feasible for hardware repair, and lower the cost of replacing equipment through volume discounts.

The Budget Profile benchmark is a first step in understanding these issues. The Budget Profile is the distribution of the total budget into standard budget categories, and sheds light on how IT budgets are allocated (Table 3.)

Benchmark #3

Budget Profile = ***Percentage Distribution of IT Costs by Budget Categories***

Table 3. Budget Profile (average)

Budget Category	BG	BLA	Masters
Salaries/Benefits	46%	53%	45%
Student Help	3	4	4
Contractual/Consulting	7	4	6
Hardware	31	24	32
Software	8	8	8
Professional Development	1	2	2
Other	4	5	3

PEER COMPARISON: *For the Budget Profile, there are three areas where Hamilton differs from its peers—use of student help, hardware replacement, and software purchases. Hamilton relies heavily on students to provide IT support, and this is reflected in the budget for student help being 5 percent of the overall IT budget, which is in the top 25 percent of its peers. Among other things, this implies that Hamilton has to pay significant attention to how these students are trained and managed. Institutions that fund replacement plans through the annual budget should see hardware and software categories representing a substantial portion of the total IT budget. Hardware and software budgets put Hamilton in the top 25 percent of its peers, reflecting the fact that it has a fully-funded replacement plan in place for all college-owned computers, basic productivity software, network electronics, and even data projectors.*

Some general observations about the Budget Profile are warranted. The first three categories (Salaries/Benefits, Student Help, and Contractual/Consulting) can be thought of as the parts of the IT budget devoted to delivering services, using college professional staff, students, or outsource arrangements with companies. The next two categories (Hardware and Software) represent budget components allocated to the replacement and maintenance of IT infrastructure. A major lesson of the last 20 years has been that IT infrastructure is not a one-time expense but rather an ongoing funding need similar to maintenance of the physical plant. However, many institutions still do not have regular replacement cycles for their infrastructure. In other words, they have a significant deferred maintenance problem for technology.

The Professional Development category represents a small but often incorrectly ignored part of the budget. This provides for the ongoing professional development of IT staff. Failure to provide adequate resources in this area is at the peril of the institution. Some institutions indicate that they do not provide professional development for their staffs for fear they will then leave when they improve their skills. Yet, these institutions will be in worse shape if they do not provide for the training of their IT staffs and they stay! (Note that the Salaries/Benefits percentage for BLA institutions reflect their generally higher staffing levels compared with other institutional types.)

CARNEGIE CLASSIFICATION COMPARISON: *Determine your institution's Budget Profile. Are there areas that are non-typical relative to institutions of your Carnegie Classification?*

There are three key services that provide support for IT infrastructure: Desktop Computer Repair, Hardware/Software Installation and Renewal, and Network Services. As the Staff Service Profile benchmark (see page 8, Table 4) shows, these three areas represent, on average, 20–30 percent of the overall staff needed to support IT services.

BENCHMARK #4

Staff Service Profile = ***Percentage Distribution of IT Personnel by Service Areas***

Table 4. Staff Service Profile: Infrastructure Services (Average)			
Infrastructure Services	**BG**	**BLA**	**Masters**
Desktop Computer Repair	11%	6%	7%
Hardware/Software Installation and Renewal	7	7	7
Network Services	13	10	8
TOTALS	**31%**	**23%**	**22%**

Table 4 illustrates the lack of economies of scale as the percentage devoted to infrastructure services varies inversely with the size of the institution[3]. For example, a large number of people are needed to support the tasks associated with running a network regardless of the size of the network (e.g., security, authentication, server administration). Infrastructure services represent a higher percentage of overall staffing for the smaller institutions. It is for this reason that infrastructure services are likely candidates for outsourcing arrangements, or cooperative agreements among several colleges. Adopting a strategy of significant outsourcing will be reflected in the Budget Profile for an institution, showing a greater percentage being devoted to Contractual/Consulting and less to Salaries/Benefits.

Peer Comparison: *In each of the three Infrastructure Services areas, Hamilton falls outside the typical range. Hamilton outsources its Desktop Computer Repair—this area represents 0 percent of its service staffing. However, the vendor provides a person who is on-site full-time and contract costs have remained essentially constant over the past five years. Hamilton's Hardware/Software Installation and Renewal area makes extensive use of student help and all replacements are accomplished during the summer months in a highly efficient manner. The College devotes a higher percentage of staff effort to Network Services than its peers. Officials feel that this is partly a result of lack of economies of scale and partly because they have made the reliability and security of their network a top priority.*

Carnegie Classification Comparison: *Examine the Staff Service Profile for infrastructure services for your institution as compared with those in your Carnegie Classification. Which, if any, infrastructure services do you outsource?*

It is also important to understand the magnitude of the desktop computing infrastructure that must be supported and the relationship between the number of computers and available support staff. This is measured by the computer availability and staffing level by service area benchmarks. The Staff Service Profile benchmark is also used in the next sections to discuss enterprise systems (Tables 6 and 7 on page 13) and user support (Table 10 on page 18).

The Computer Availability benchmark provides a measure of the number of computers provided by the institution relative to institutional size. While the trend has been for students to bring computers to campus, institutions continue to invest heavily in computers that are accessible in public computer labs and departments.

BENCHMARK #5

$$\text{Computer Availability} = \frac{\text{Total Headcount Employees + Students}}{\text{Total Number of Institutional Computers}}$$

Table 5 indicates that BLA institutions have the most hardware per capita, with roughly one computer for every two members of the campus population.

TABLE 5. COMPUTER AVAILABILITY

Carnegie Classification	25th Percentile	50th Percentile	75th Percentile
BG	2.1	3.0	3.3
BLA	1.9	2.3	2.7
Masters	2.6	3.7	5.2

PEER COMPARISON: *Hamilton's number of institutional computers is in the typical range relative to its peers. The College places an emphasis on close collaboration between faculty members and students. These relationships are often supported by computer labs in departments, resulting in a large number of institutional computers. Hamilton has made a decision to provide these computers, in spite of the fact that more than 90 percent of students bring their own computers. Most of the College's peers have made similar decisions and hence its appearance in the typical range on this benchmark.*

What, then, are strategies to create a solid IT infrastructure, especially for smaller institutions and those with fewer per capita resources of staff and money? Some possible answers (found below the questions posed in this section) include planned replacement schedules, stronger standards, and service approaches that include effective use of students and outsourcing.

Schedule. **On what schedule will the infrastructure be funded for replacement?**

The areas of IT infrastructure that need regular renewal are: computers, software, and network electronics.[4]

Determining a replacement strategy in each of these three areas should be based upon a number of considerations: differing needs of those using the technologies, the cost of periodic service of existing equipment, and the staff required to support these infrastructure components. Unlike most other things in life, technology doesn't generally "wear out" in the way a shirt does. Electronics have become highly reliable and it is only when the technology cannot accomplish current needs efficiently that it should be replaced. Having a fully funded replacement strategy is more important than precise replacement cycles.

The main driving force behind the need for replacing network electronics is to achieve faster speeds on the network. For example, widespread use of multimedia materials (images and sound) consume significantly more network bandwidth than text. For wired networks, it appears that replacing electronics on a five-year schedule is usually adequate. The magnitude of that expense will depend upon the number of network connections being supported on a campus. At a residential college where most students bring computers, this usually includes one network port for every student in a residence hall.

Given the continued rapid and uncertain development of electronics for wireless technologies, it is likely that a shorter replacement cycle may be necessary if an institution implements wireless. This should be a consideration for schools considering wireless versus wired strategies. Regardless of the particular technologies being replaced, the cost of implementing a replacement plan is affected by the existence of campus IT standards.

The need for desktop computing power in public labs and classrooms also varies among faculty, staff, and students, and this variation should be taken into account in the replacement plan. Typical replacement cycles are currently three to four years[5]. However, in the last decade there have been dramatic improvements in the cost/performance ratios for computers. In fact, for most routine tasks that people do (e.g., e-mail, word processing), the computers on their desks are very capable of meeting needs. This suggests that replacement strategies should be based on need rather than the availability of faster hardware. Given the power of current computers, institutions should be considering longer replacement cycles for most users. This will save money without compromising the ability of people to do their jobs.

Standards. **What infrastructure standards will be adopted to enhance the quality of support and promote efficiency?**

Supporting both Macintosh and Windows operating systems is common in higher education, especially in academic departments where software used in a particular discipline might run on only one platform. However, this is a decision that institutions should make proactively. Supporting more than one operating system will bring additional direct support costs and missed opportunity costs. For example, by choosing to support only one operating system, the institution will likely be able to receive additional volume discounts when purchasing replacement systems.

Whatever the replacement cycles, the institution should select one vendor for the computer hardware for each operating system (e.g., Macintosh, Windows). Each additional vendor used creates additional coordination costs, minimizes the opportunities to take advantage of purchasing discounts, and likely results in increased costs for hardware repair.

Given the reliability of modern computer hardware, support questions are generally about software rather than hardware. To simplify support, it is essential that institutions adopt standards for the software that is supported—that is, one word processor, one spreadsheet, and one presentation program. If diversity in the software environment is not controlled, support will invariably require more people and expense. Typically, institutions choose a "suite" of software from one vendor for all these applications. The suite provides consistency in moving data from one application to another and a shorter learning curve.

Reliability and integration are essential for the campus network. Similar to hardware and software, the institution should therefore choose one vendor to supply all the network electronics. Looking to local distributors and strong national products is advisable since they can provide service and expertise for this equipment.

Sourcing. **Which infrastructure services will be provided in-house and which can be outsourced?**

A number of options should be considered for repairing desktop computers before deciding that this service should be staffed in-house. One approach is to buy extended service agreements for new computers so that they are covered until they are replaced. The manufacturer then handles repair at no cost to the college. Alternatively, outsourcing the repair of computers can be cost-effective depending upon the availability of a local service organization. Each of these alternatives should be considered.

Institutions have sometimes considered leasing desktop computers to simplify installation of new systems and disposal of old equipment. Leasing also moves associated costs from capital budgets to operating budgets. This option should be explored carefully to see if it achieves true cost savings.

President's Checklist: *Does your institution have an accurate inventory of the computers that exist on campus? Such an inventory is the necessary starting point for any replacement plan. Is there a written plan for replacing college-owned computer equipment and the funding to implement it? What standards, if any, does your institution have for the operating systems that are supported? Which brands of computer hardware are purchased? Are there standards for software that are supported?*

How Should Enterprise Systems Be Designed?

Administrative systems and web services are relied upon by almost everyone at a college, and are known as "enterprise systems."

Overlaying the technology infrastructure are two institution-wide systems:

- an administrative system that supports multiple business functions and
- a web services architecture that provides access to the Internet and perhaps a campus portal.

Administrative systems, also knows as Enterprise Resource Planning (ERP) systems, are the software and hardware that support business functions to automate and integrate tasks such as paying college bills, storing data about applicants for admission, keeping alumni records, and so forth. These systems were the first extensive use of technology on most campuses. Their integrity, reliability, and responsiveness continue to be essential to institutions today.

Web services are a more recent arrival on the technology scene and have quickly become essential. Not only do web services give everyone on campus access to the Internet, they also provide a way to access and organize information conveniently for a variety of campus users. A campus web portal customizes the organization and presentation of information through a web browser in ways that can be tailored to each individual. Campus portals are increasingly common.

There are five inter-related decisions about enterprise systems that colleges face:

One or Many. Will we adopt several pieces of software that perform the various needed functions or one integrated system?

Customization. How much will we customize vendor systems to conform to the way we do things?

Data Integrity. Are there standards for data and are data stored in one place to avoid redundancy?

Integration. To what degree do we integrate administrative and web services to enhance access to information?

Retrieval. To what degree can responsibility for the ownership, manipulation, and reporting of data be lodged with the people who need to use the data?

The answers to these questions will determine the reliability and usefulness of enterprise systems. Equally important, the answers will indicate the level of efficiency and thus the cost at which these systems can be run.

Because changing an enterprise system is an expensive and energy-intensive process, it is not undertaken lightly by most colleges. When administrative systems first evolved, some colleges developed their own programs. As commercial software became available to perform particular functions, some schools purchased packages and integrated them. Today, completely integrated packages are available. They are major investments and require a long-term commitment given the resources needed to switch to something else.

Campus web portal services seem to be evolving in much the same pattern, with many schools having developed their own at first. As commercial products became available, schools have begun to adopt them. In general, no single school can have the resources or depth of talent to develop and maintain a product at a level that a commercial developer can.

Some schools continue to write their own software for certain enterprise functions, believing that they can achieve a competitive advantage. The tension in developing enterprise systems is often around flexibility versus maintenance of the system. Multiple systems and extensive customization usually require more staffing and are less reliable.

Benchmarks can inform our thinking about enterprise systems by examining the staffing levels that are devoted to developing and maintaining them. The Staff Service Profile introduced on page 7 shows that, on average, about one-quarter of IT staffing is devoted to enterprise systems (see Table 6).

TABLE 6. STAFF SERVICE PROFILE: ENTERPRISE SYSTEMS (AVERAGE)

Enterprise Systems	BG	BLA	Masters
Administrative Systems	15%	16%	16%
Web Services	9	7	6
TOTALS	**24%**	**23%**	**22%**

What does this mean in terms of actual numbers of people? At some small institutions, especially those with fewer resources, a single person "does it all" for each of the critical enterprise systems. At other institutions, many programmers still linger from earlier days when the school wrote its own software code. Modern systems should allow the college to minimize programming staff by relying on vendor support. Table 7 shows the typical range for staffing in these support areas at BG institutions.

TABLE 7. STAFF SERVICE PROFILE: ENTERPRISE SYSTEMS (BG)

Enterprise Systems (BG)	25th percentile	50th percentile	75th percentile
Administrative Systems			
Percentage of IT Staffing	8%	13%	22%
Number of People	*1.3*	*2.0*	*3.0*
Web Services			
Percentage of IT Staffing	5%	8%	11%
Number of People	*0.4*	*1.0*	*1.0*

PEER COMPARISON: *Hamilton devotes a lower than average number of staff to administrative systems. The College's 14 percent compares with an average of 21 percent for the peer group and a typical range of 16–27 percent. Hamilton runs one central administrative system with minimal customization. However, since the College is outside the typical zone, it will reexamine its staff allocation and determine whether it is providing a satisfactory level of service to the College community in the area of administrative systems.*

One or Many. **Will we adopt several pieces of software that perform different functions, or one integrated system?**

Colleges have struggled with the question of whether it is more cost-effective to buy one integrated administrative system, or buy separate modules from different vendors. The latter is known as the "best-of-breed" approach and has the advantage of providing a system for a specific college function that most closely fits the way that college does its work. At the same time, the best-of-breed approach is more labor-intensive, since each module must be integrated with the others, a service rarely provided by the software vendors. Choosing a best-of-breed approach can be seen as a decision to allocate scarce incremental dollars to tailor systems to particular tasks or people. It is rarely clear that the financial or service advantages are worth the cost. A president should be highly skeptical that this approach will achieve competitive advantages worth the money it will cost and should ask hard questions before committing to such a strategy. One integrated system usually has significant maintenance and reliability advantages, even if a modest level of functionality is sacrificed.

This same question arises in the area of web programming. Since this is a new service, many institutions are developing their own custom web applications. What programming language should they be written in? New programming languages are being released all the time. Colleges risk obsolescence and major rework of their new applications if they use a programming language that is no longer supported. Since industry clients are the best paying customers for technology vendors, programming languages and other technology that has achieved widespread commercial use in industry is most likely to be supported in the future. Institutions should look in the direction of industry as they adopt their technology tools. While it may be tempting to experiment with new unproven technology, technology systems are now so important to a college and so expensive an investment that colleges can rarely risk the unreliability and labor for maintenance that can result from using experimental technology tools. When colleges experiment, they must do so knowing that they are allocating scarce technology dollars and scarce human energy to a project that may not pay off.

Customization. **How much will we customize vendor systems to conform to the way we do things?**

If systems are purchased, it is often better to influence the vendor to make needed changes and integrate them into the central system. When implementing a system, it is usually advisable to try to adapt the college process to fit the software. In other words, the software should be adopted in "plain vanilla" fashion to allow seamless upgrades. Local customization always results in a higher cost of software maintenance.

Customization should only be undertaken when significant cost savings or clear competitive advantage can be proven. New versions of a software package are released frequently. With each release, the customization implemented by the college will have to be reworked. Customization can hinder reliability and slow the progress of getting the new functionality supplied by the vendor into place. Colleges will not be able to upgrade the software because they will be waiting for the local customization. The customization that is currently occurring at many colleges in the web arena indicates both that web programming is a new service and that schools see web development, especially portals, as a way to achieve competitive advantage. Over the long run, this environment will also stabilize and it will make sense to adopt an integrated vendor solution.

Data Centralization. **Can pieces of data be stored in one place and used for multiple functions?**

Whether using one central system or a best-of-breed combination, an important strategy for storing data is to adopt a "one-store" policy. That is, a piece of data should be stored in one place only and used by many systems. This policy, combined with data format standards that are broadly understood and adhered to, ensures that data are accurate and managed in the most efficient way. Imagine, for example, that your address is stored in both the student record system and the alumni system. Without a one-store strategy, if you request a transcript from the registrar and update your address, you will discover

later that your address in the alumni system was not updated and fundraising solicitations have been sent to the wrong place. Purchasers of systems should ensure that the system they are considering works on the "one-store" strategy. In some systems, the same piece of data is stored in multiple places, but the systems themselves automatically synchronize the data based on an integrated hierarchy.

Data input standards are also important. Training people who are entering data on how data should be entered into your system pays off in improved data integrity. Since humans naturally make errors, look for systems with integrated data checking systems when purchasing new products as well.

Integration. **To what degree can we afford to integrate administrative and web services to enhance access to information?**

Most institutions today are looking at the integration of administrative information and web services as an essential part of their technology strategies. It is only when data are pushed closest to the people who actually use them that administrative overhead can be reduced and service to various constituencies can be improved. Unfortunately, few—if any—comprehensive administrative systems have integrated web portal applications, so this is an area requiring customization if this functionality is to be developed. This is an example of the tension between the inevitable cost of customization and the hoped-for cost savings and innovation that could result through the use of administrative data on the web. In general, institutions with more resources are able to develop this functionality and those with fewer resources will have to consider carefully where there is maximum payoff.

Retrieval. **To what degree can we expect ownership, manipulation, and reporting of data from the people who need to use them?**

Many management books in recent years have discussed the powerful productivity and service advantages that result from empowering the employees who are closest to the customer to be fully responsible for the work product. One frustration on most campuses is the challenge of retrieving and manipulating data from a central administrative system. Relying solely on IT programming staff results in a time delay and a bottleneck on the programmers' desks.

Institutions that are truly taking advantage of the power of their enterprise systems today are encouraging talented support staff in offices to gain the skills to update, extract, and manipulate data from the college's enterprise system. These institutions are also setting up data warehouses with file structures that are easy to access, comprehend, and use. Remote printing over the network empowers the users of the data on the front line to make and print their own reports. Many colleges are teaching staff members to use web editing software or are creating simplified web update environments. Much of the traditional work of secretaries has been automated. For example, most faculty members now word-process their own syllabi. At some colleges, the organization of meetings has been streamlined by implementing an electronic calendar system. These automations have opened windows of opportunity in staff time. Placing responsibility and skills outside of central IT can provide opportunities for employees to learn and grow. Most support staff welcome the additional skills and rewards that come with taking more responsibility for sophisticated updating and use of enterprise systems.

PRESIDENT'S CHECKLIST: *Examine your Staff Service Profile (see page 7). Does your institution customize your administrative system in any significant way? Do the users of administrative systems have easy access to data that they need and are they trained to retrieve and manipulate them to their advantage without relying on IT staff?*

How Should Users Be Supported?

As discussed in previous sections, 20–30 percent of IT staffing is typically devoted to infrastructure and about 25 percent of staffing is devoted to enterprise systems. What are the remaining 50 percent of the staff devoted to? Most will be helping people use the systems, or what is called "user support."

Because the equipment provided by a college is only as useful as the ability of faculty members, students, and administrative staff to use it, "front-line" user support is necessary. User support services are defined as those that typically involve person-to-person interaction to solve a particular technology-related problem or to provide assistance in working on a project that uses technology.

User support services evolve differently on various campuses, but most colleges provide four key services:

- a training program that is proactive in trying to help people increase their knowledge of technology features or introduce a new specialized software;
- a helpline that people can call, e-mail, or visit for immediate services;
- a student support program that usually operates more hours than the helpline, addressing student needs both on- and off-campus, generally through staffing of the public computer labs; and
- a curricular support program for faculty members who are working to incorporate technology into the classroom.

The simplicity of the infrastructure and enterprise systems, the quality and reliability of those systems, and the overall level of technology expertise among the various campus constituencies determine the need for support. If a campus has followed the guidance of standards, simplification, and limitations on customization for infrastructure and enterprise systems, the college will be in a strong position to minimize support. Nevertheless, support will still be needed.

The four major questions about user support services are:

1. ***Service Level.*** What level of expertise is needed at what time of day? How soon must the problem be solved?
2. ***User Motivation.*** How can campus constituencies be motivated to increase their technology expertise and thus rely less on IT staff to achieve their goals?
3. ***Sourcing.*** What level of expertise can be provided in-house and what should be provided through outsourcing?
4. ***Partnerships.*** Which on-campus partnerships make sense to maximize service?

To examine what is happening on your campus, you will again want to begin with benchmarks. It is useful to look at how many campus users the IT staff is supporting overall. This is shown through the Staff Support Level benchmark.

This benchmark gives an indication of the number of people that each full-time-equivalent IT staff member is expected to support. In other words, it provides a measure of the day-to-day workload.

Benchmark #6

$$\text{Staff Support Level} = \frac{\text{Total Headcount Employees + Students}}{\text{Total IT Professional and Student Staff}}$$

Table 8. Staff Support Level			
Carnegie Classification	**25th Percentile**	**50th Percentile**	**75th Percentile**
BG	104	136	168
BLA	52	60	75
Masters	81	107	140

Table 8 shows that each IT staff member at a BG or Masters institution must support roughly twice as many people as an IT staff member at a BLA college.

It is also worth delving deeper to look at the staff support level for helpline services alone. You can see in Table 9 that the pattern holds, with helpline staff at BLA institutions needing to support significantly fewer campus technology users.

Table 9. Staff Support Level: Helpline Support			
Carnegie Classification	**25th Percentile**	**50th Percentile**	**75th Percentile**
BG	813	842	1,277
BLA	434	622	997
Masters	620	1,215	2,224

Benchmarks can help your campus think about the relative investments you are making in these services. The Staff Service Profile (introduced on page 7) for user support services in Table 10 shows the investment of staff for each user support service.

TABLE 10. STAFF SERVICE PROFILE: USER SUPPORT (AVERAGE)

User Support	BG	BLA	Masters
Training	5%	4%	3%
Helpline	16	12	11
Student Support	10	15	24
Curricular Support	5	11	9
TOTALS	**36%**	**42%**	**47%**

As you can see, most colleges have chosen to allocate only small percentages of staff to training (3–5 percent), probably because they recognize the inherent difficulties of reaching the audience. On most campuses people are, unfortunately, unwilling to invest large amounts of time in pursuing technology training. There are outliers in these data though, with some schools reporting as much as 20 percent of staff devoted to training endeavors. If you devote more than 20 percent, you will want to be assured that your institution is seeing the payoff in employee performance that reflects the effort.

Student support is usually handled on campuses in one of two ways. Some use the central helpline, while others set up a separate help facility, either student-run or staffed by a combination of students and professional staff. This help is often located in public computer labs. Most of today's students have grown up with computers and one can assume that most are comfortable with them. In a recent survey of first-year college students, 78.4 percent indicated that they used the Internet for homework or research during their last year of high school[6].

The student schedule is also not the same as the business day. Evening and weekend hours of support are often required. Colleges that maximize their use of student staff have more resources available for other services. Full examination of the COSTS benchmarks shows that using students to support students is less expensive in most cases.

Curricular support is another area of interest to most presidents. Since education is the primary function of a college, using technology wisely in the curriculum is strategically important. Indeed, most faculty members who make the effort find the results to be very rewarding. At the same time, many faculty members tend to be novice technology users. Even for the more experienced technologists among the faculty, incorporating technology into the curriculum can be very time-and labor-intensive and help is essential to ensure success.

Table 11. Hamilton Versus its Peers (Average)		
Staff Service Profile—User Support	**Hamilton**	**Peer Comparison Group**
Training	3%	4%
Helpline	13	11
Student Support	32	8
Curricular Support	11	12
TOTALS	**59%**	**35%**

Peer Comparison: *As Table 11 shows, Hamilton staffs user support services somewhat differently from its peers. Hamilton devotes a much higher percentage of its staff to student support (primarily through its public computing labs). The detailed comparison shows that Hamilton devotes professional staff comparable to the average (about one staff person) but employs many more students to provide student support. Hamilton used 12.3 full-time-equivalent students to provide student support as compared to an average of 2.3 for the peer group. The COSTS peer analysis shows that in its IT labor force, Hamilton employs 17.5 FTE employees in student labor compared to 10 for the peer group, so Hamilton consistently uses more students in all services to make up for a smaller professional staff. Is using more students a cost-effective strategy? The analysis further shows that Hamilton spends $50,000 more than average in student wages and almost $500,000 less on professional wages, indicating that using students is very cost-effective.*

The Staff Support Level benchmark (see page 16) indicates the number of faculty members per curricular support staff, as shown in Table 12.

Table 12. Staff Support Level: Faculty Curricular Support			
Carnegie Classification	**25th Percentile**	**50th Percentile**	**75th Percentile**
BG	108	212	326
BLA	32	45	71
Masters	67	134	180

BLA colleges are able to provide a much higher level of support to faculty members who want to use technology in the curriculum. Each staff person at a Masters institution must support more than twice as many faculty members and at BG colleges more than four times as many. Even at what appears to be a rich level of support at BLA colleges, the time and intensity required for innovative curricular uses of technology make it likely that faculty members are not supported at an optimal level.

PEER COMPARISON: *At 49-to-1, the ratio of faculty members per curricular support person at Hamilton is at the 75th percentile for the peer group. Among the ten schools in the peer comparison, the ratio varies from a low of 17 to a high of 88 faculty members per curricular support person. The typical range is 29 to 49. Given this information, Hamilton would want to assess whether it is allocating adequate staffing to curricular support, especially given its strong emphasis on teaching and faculty-student collaboration. At the same time, its curricular support personnel in IT have a strong partnership with the library, thereby increasing their ability to support faculty innovation in an efficient and effective manner.*

Service Level. **What level of expertise is needed at what times of day and how soon must the problem be solved?**

Most college campuses operate on almost a 24-hour day. One has only to examine traffic patterns on a campus network to see that traffic drops only during the hours from 3:00 a.m. to 6:00 a.m. Otherwise, people are using their technology throughout the day and night. IT organizations face the monumental challenge of trying to support people around the clock. A multi-pronged approach is most successful. As mentioned before, in addition to a helpline open during business hours, most colleges use student labor to staff help facilities that are open in the evening. Electronic answers to "frequently asked questions" for common problems can be available on the IT website. Infrastructure planning can include automating tasks such as updating virus software, thereby minimizing the problems in the first place.

Your campus should agree on and inform the community about service level agreements. Technology users should know what alternatives are available to them if their technology fails. If the network is down in one student room, it is far different from the entire network being down across campus. For the former condition, there are many options. The latter would require immediate IT response, no matter what time of day or night. It is important that people on your campus know what kind of IT support you can afford to provide so that they can have realistic expectations.

User Motivation. **How can campus constituencies be motivated to increase their own technology expertise and thus rely less on IT staff?**

Reducing institutional expenditures for IT support can be accomplished only by simplifying and standardizing the infrastructure (as discussed in previous sections of this paper) and by increasing the level of technology comfort and expertise among faculty members, students, and other employees. Comfort and expertise with technology increases on campuses where there is a culture that expects basic technology proficiency. That kind of culture comes not through the IT organization, but rather through strong messages from leadership. Built-in organizational structures also motivate people to gain technology skills. Some structures that promote technology skills are staff compensation systems that value technology skills, technology components built into the curriculum that encourage student and faculty use, and rewards for uses of technology that result in increased productivity or innovation.

When thinking about the motivation for training that you need on your campus, it is useful to focus on basic human nature. In general, people do not read manuals unless they have to. Most people will ask the person next door before opening a book. Even so, distributing one set of useful books on the office software to each department where they will be easily available can be beneficial. Some campuses also explore on-line training, but it isn't always clear that on-line training software is worth it. Few people have the self-motivation to do on-line tutorials. On-line training software does work if assigned and graded as part of a course assignment. When organizing formal training programs, remember that everyone has good intentions about attending formal training classes, but when the day arrives, it is often easy to find an excuse to skip the class. Establishing a modest financial penalty for missing a class can be a useful incentive. Once you get people to classes, remember that they need just-in-time training with real-world applications delivered in small chunks that they can absorb. Technology use is the same as any skill—unless quickly applied, it is quickly forgotten.

Sourcing. **What level of expertise can be provided in-house and what should be provided through outsourcing?**

Careful decisions should be made about which areas of expertise are important for IT staff development versus which needs for expertise should be outsourced. It is often a good idea to outsource training to a local professional training company. For the IT staff, this reduces the overhead burden of preparing training classes and may result in more consistent and effective delivery as well as better training materials.

Another debate is whether IT staff should be generalists or specialists. Most campuses cannot afford to have many narrowly focused IT staff. If you follow the advice of adopting standard hardware and software, your IT staff has a better chance of keeping up, both with the changes in technology and the workload itself. Finding consultants who can provide the depth of expertise needed in more complex areas such as specific curricular or research software is also a good use of resources.

Partnerships. **Which partnerships make sense to maximize service?**

Most IT organizations have more demand for their work than staffing available. Seeking out possible partnerships within the college community is another way to extend staffing, increase technology expertise broadly, and improve the campus technology-related well-being overall.

A partnership between librarians and IT staff is one of the most promising avenues to increase technology support. Librarians have extensive experience researching problems and finding solutions. Librarians are often close to faculty members and understand curricular goals. The library is usually staffed well into the night, making personnel available on the students' schedule. The ability to find, manipulate, and present information often requires the expertise of both librarians and technologists.

In addition to the library, other partnerships can be fruitful. Department secretaries can be empowered to use technology and support and train others. Look to unlikely places where capacity may have evolved over time and see if that labor can be put to good use in support of technology. You can also look to neighboring colleges. If you can agree to adopt similar technical environments, it may be possible to partner on support. For example, three neighboring schools could share a common on-call network support structure, offer joint technology training classes, or share specialists in specific software.

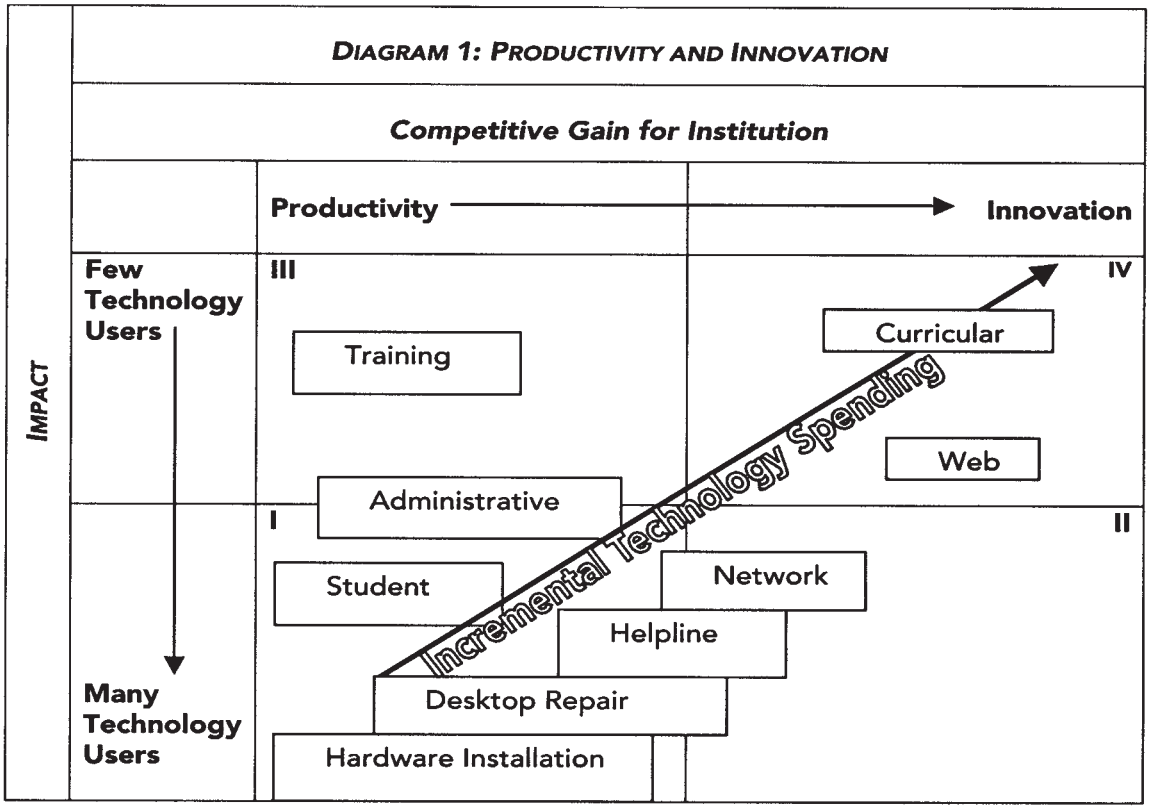
How Does IT Contribute to Competitive Advantage?

How does a college allocate IT dollars to "get ahead" competitively? While it is surely innovation that provides competitive advantage for any organization, innovation in the IT arena is more costly than providing basic productivity. All of the IT services examined in the COSTS Project should be considered essential to colleges today, but some are more vital than others. Colleges with fewer resources will need to focus on the most vital services first, choosing investments in the others far more judiciously. To discuss services in this context, we look at them in terms of a continuum from productivity to innovation.

Certain IT services, provided at a reasonable level of quality, are essential to the basic productivity of an academic community. Other services may be considered less essential for some colleges and should wait until resources can be garnered for them. It is the services related to innovation that may have to come later. For example, support for curricular innovation may be postponed. While most institutions hope to innovate in ways that benefit their academic mission, additional dollars for innovation are not always available.

Moreover, innovation cannot be pursued unless basic productivity is ensured. The diagram below graphically depicts the essential IT services as they relate to productivity, innovation, and the expanding financial burden for a college. Each institution will have to determine where it can afford to be on the continuum and what it can afford to invest in innovation. The choice point is generally between dollars invested to reach many people in the community in shallower but critical ways (basic productivity) or to reach a few people in deeper ways (innovation) with a greater investment.

Providing basic services in quadrant I (see Diagram 1 below) at minimal cost through the adoption of standards, reducing diversity, and improving user expertise, is the only way that resources can be made available for innovation, even if a college has abundant resources.



Institutions with fewer resources can assess staff productivity by looking at peer schools. Using the COSTS data, you can plot your institution against those with fewer or greater resources and examine how many staff members are being allocated to production activities versus innovation activities. The kind of institution that you are and your strategic focus will, of course, determine what is right for you. At the same time, it is fair to say that if your institution has more resources, you should be able to move further toward innovation, moving into quadrant IV activities. The challenge for those with fewer resources will be to find ways to minimize the basic support needed for productivity and begin to move staff to support innovation, especially in the curriculum and on the web.

Diagram 1 plots IT services by the level of support effort that is required for the probable outcome. For example, we show training as a quadrant III service, since formal training programs require intense effort to prepare materials and mount classes. At the same time they are likely to reach only a few people, since employees and students generally resist attending formal training classes. Because the helpline and student support often address common, repetitive questions, a few people are able to help many. While providing and supporting a course management system (CMS) can serve many faculty members at modest cost, curricular support can also be idiosyncratic to the goals of an individual faculty member and is therefore very labor-intensive.

Tables 8, 9, and 12 in the previous sections shed light on the relative level of support for different services and reinforce the ideas that the helpline is an essential service and that curricular support is a more optional service, available only to colleges that have more funds to invest in broader innovative initiatives on their campuses. For example, when comparing the typical range for BGs versus BLAs, you see that at the 50th percentile, BLAs, which have more resources available in general, have more than twice as many IT staff, but BLAs only allocate 26 percent more staff to the helpline. On the other hand, they allocate five times the staffing effort to curricular support. This shows that all colleges must invest first in essential services that keep things running for basic productivity and can allocate resources to optimal and perhaps more innovative endeavors only when additional resources are available.

Benchmarks—Keeping Investments on Track

Few would argue with the statement that information technology has become an essential part of the college experience. Now it is possible for presidents and other senior administrators to manage these resources in ways similar to other, more traditional resources.

Benchmarks are the lighthouses that can guide presidents in making resource allocations and determining institutional IT strategies. Using benchmarks, institutions can obtain early warnings when strategies appear to be going in the wrong direction and to help point the institution toward sustainable funding approaches.

Rational resource allocations, based on available institutional resource calculations, assure that the basic infrastructure is supportable, enterprise systems provide needed information, and basic support services are provided in an efficient and effective manner. Presidents can then begin to think strategically about what additional resources are available to support innovation without sacrificing the core services that make IT useful. All this is possible, and necessary, if IT resources are to serve the institutional mission.

President's Checklist: *Where is your institution now on the productivity/innovation curve and where do you think it should be? Can you optimize quadrant I activities and thereby afford to move staff toward innovation to achieve competitive advantage? Are there opportunities for efficiencies or outsourcing quadrant I services that would make resources available for innovation?*

Appendix A

Six COSTS Benchmarks	
Budget Impact	The percentage of the institutional budget represented by the IT budget (institutional budget is net of financial aid)
Budget Support Level	The per capita budget for IT, the denominator being the total headcount of employees plus students
Budget Profile	The percentage distribution of the IT budget into standard budget categories
Staff Service Profile	The percentage distribution of IT personnel by service areas
Computer Availability	The ratio of total headcount employees and students to total institutional computers
Staff Support Level	The ratio of total headcount employees and students to total IT staff

COSTS Service Area Descriptions

1. Administrative Information Systems. Technical support provided for centralized information systems that are used by the offices of the college, e.g., Admissions, Financial Aid, Registrar/Student Affairs, Business Office (General Ledger, Accounts Payable/Receivable, Payroll), Human Resources, Alumni/Fundraising, Inventory/Work Control. Typical services provided in this area include systems analysis, programming, and assistance with reporting and operations.

2. Helpline Services. A call-in problem-solving service designed to provide help to staff and students experiencing problems with information technology resources, of an immediate and important nature. The telephone is the primary means of accessing this service; other forms of communication (e.g., e-mail, web) may also be utilized. Callers have their problems resolved over the phone, by visits to offices, or by referral to other parts of the organization.

3. Desktop Computer Repair. Repair of college-owned desktop/laptop computers and printers, excluding only central servers that are reported in Network Services (see #9, next page). Typical services provided in this area include diagnosis and repair of hardware problems and related software problems.

4. Training. Activities related to helping members of the institution learn to use information technology resources. Typical services provided in this area include scheduled classes, small group and individualized learning, creation of documentation, and provision of self-paced learning materials.

5. Curricular Support Services. Support provided to faculty in connection with teaching (and research, if provided by IT). Typical services in this area are consulting, assistance in locating and testing instructional hardware and software, help in the creation and use of multi-media materials, support for distance/asynchronous/on-line learning, and instruction in the use of these technologies.

6. Hardware and Software Installation and Renewal. Activities related to the periodic installation and replacement of college-owned desktop computer hardware and software. Typical services provided in this area include selection of replacement systems, installation of new hardware and software, and transferring of files from old to new systems.

7. Web Support. Technical support of the college's web efforts including the operation of the central web server, but not direct support to faculty for courses that would be provided through curricular support services (see #5 above). Typical services provided in this area include the design and creation of web pages, consulting with departments on how to use the web, and oversight of server operating environments.

8. Student Support. Activities related to the support provided directly to students other than through a centralized helpdesk. Typical services provided in this area include the operation of public computing facilities and the servers that support their operation, and direct support to students living in residence halls.

9. Network Services. Maintaining the infrastructure (wiring, hubs, etc.) and the central servers on the campus network, including the connection to the Internet. Typical services provided in this area include administration of campus-wide servers (e.g., e-mail, print, file storage, DNS/ DHCP), including security and maintenance of wiring and electronics.

10. Administration and Planning. Central coordination and management of the IT organization, research and development, and long-range planning. Activities unrelated to providing direct day-to-day technical support. Estimate percentages of time spent in management activities (coordination, supervision, evaluation, team-leading, planning), e.g., if 10 percent of a person's time is spent in management rather than support activities, this should be reported as 0.1 FTE under #10 and 0.9 in the other areas of direct support.

11. Other. If any IT support services cannot be categorized in #1–10 (above), they should be included in the "Other" category when entering staffing data.

Appendix B. Breakdown of Private, Non-profit Institutions by Carnegie Classification [7]

Type	Number of all	Percentage of Total	Number of CIC Institutions (2003)	Percentage of CIC Total	Number in COSTS FY02*	Percentage of COSTS Total
Doctoral	93	6%	6	1%	1	1%
Masters	331	20	202	39	13	14
BLA	202	12	114	22	63	70
BG	266	16	172	34	9	10
BAA	31	2	7	1	0	0
AA	159	9	2	1	0	0
Specialized	593	35	10	2	4	5
Tribal	6	0	0	0	0	0
Total	**1,681**	**100%**	**513**	**100%**	**90**	**100%**

*Note: For the institutions considered in this article, the average headcount for employees + students is:

BG – 1,603
BLA – 2,609
Masters – 3,826

Appendix C - Example, Hamilton vs. Peer Institutions

COSTS Benchmarks	Percentile					Hamilton
Benchmark #1 (Budget Profile)	**AVG**	**25th**	**50th**	**75th**	**#**	
Total IT salaries	32%	26%	30%	36%	10	29%
Total OIT salaries	5	1	4	9	10	3
Total IT and OIT fringe benefits	10	8	10	13	10	10
Student Help	2	2	2	3	10	5
Contractual and consulting	7	2	4	14	10	9
Hardware - purchases, leases, rentals	22	15	20	31	10	26
Hardware maintenance	3	2	3	5	10	5
Software - purchases	3	2	3	4	10	4
Software licenses	4	4	5	6	10	7
Professional development	1	1	1	1	10	1
All other items	9	3	5	14	10	1
Total Salaries + Benefits	47	39	45	59	10	41.1
Student Help	2	2	2	3	10	4.9
Contractual and consulting	7	2	4	14	10	9.2
Hardware	25	19	25	32	10	31.6
Software	7	6	7	10	10	10.7
Professional development	1	1	1	1	10	1.4
All other items	9	3	5	14	10	1.1
Benchmark #2 (Budget Support Level)						
Total IT Budget/Total (employees + students)	$1,862	$1,526	$1,796	$2,243	10	$1,601
Benchmark #3 (Budget Impact)						
Total IT Budget/Institutional Budget	5%	4%	6%	6%	9	5%
Benchmark #4 (Staff Support Level)						
Total (employees + students)/Total IT staff	57	52	57	60	10	57
Benchmark #5 (Staff Service Profile)						
Administrative Information Systems	21%	16%	19%	27%	10	14%
Helpline	11	5	11	13	10	13
Desktop Computer Repair	4	1	3	5	10	0
Training	4	2	4	5	10	3
Curricular Support	12	9	12	14	10	11
Hardware/software installation and renewal	7	6	7	8	10	3
Web support	8	5	9	11	10	5
Student support	8	6	9	11	10	32
Network support	10	9	9	9	10	11
Administration and planning	8	5	7	9	10	8
Other	6	1	5	7	10	0
Benchmark #6 (Computer Availability)						
Total (employees + students)/ Total institutional computers	2.1	1.9	2.1	2.3	10	2.1

Actual Data for the Ten Institutions in the Peer Group

1	2	3	4	5	6	7	8	9	10
46%	41%	24%	26%	36%	21%	30%	30%	35%	27%
3	7	10	10	0	5	0	3	15	0
13	15	11	9	12	7	9	7	15	7
1	1	4	3	2	4	1	2	3	2
1	5	17	10	4	17	1	0	3	15
17	14	5	21	31	30	38	32	13	20
5	2	3	7	2	2	3	0	5	3
2	4	7	3	3	4	1	1	2	4
4	6	0	5	8	6	5	0	5	3
1	1	3	1	1	1	1	0	1	2
6	3	15	4	2	2	11	24	3	17
62.3	63.4	45.0	45.5	47.6	33.0	38.8	40.1	64.8	34.3
1.4	1.1	3.8	2.7	2.1	3.8	0.8	1.9	2.5	2.5
0.8	4.7	17.4	10.3	4.1	17.5	1.1	0.0	3.1	14.6
21.7	15.7	8.4	28.2	33.3	32.0	41.8	32.3	18.1	22.3
6.3	10.1	7.5	8.4	10.7	10.3	5.4	1.3	7.2	7.0
1.4	1.5	3.4	1.0	0.6	1.2	0.8	0.0	1.3	2.4
6.1	3.5	14.6	3.9	1.6	2.2	11.3	24.4	2.8	16.9
$ 1,571	$ 1,510	$ 2,808	$ 1,776	$ 1,275	$ 2,296	$ 1,816	$ 2,085	$ 1,038	$ 2,448
4%	6%	7%	N/A	4%	6%	7%	6%	4%	5%
59	57	39	69	73	52	60	58	50	53
29%	34%	16%	23%	12%	19%	19%	33%	11%	19%
10	13	12	3	25	16	6	4	14	5
1	6	1	0	12	4	4	11	3	2
1	2	2	6	4	5	13	4	3	2
12	8	17	14	11	14	13	5	8	21
8	4	6	8	3	6	8	6	10	10
4	12	9	8	8	13	9	3	12	4
16	3	13	8	6	9	0	10	12	7
13	9	9	8	8	9	7	9	9	18
3	9	15	8	7	6	5	8	11	5
4	0	0	13	3	0	16	6	7	6
3.0	1.9	2.1	1.8	2.0	1.8	2.4	1.9	2.7	1.5

Appendix D

The COSTS Project (*www.costsproject.org*) is an international effort designed to develop benchmarks for understanding investments in information technology in colleges and universities. The project is in its fifth year of a comprehensive data collection. There is no charge for institutions to participate in the project and only institutions that participate receive comparative aggregate data based on Carnegie Classification and public/private control. It is also possible for institutions to obtain comparative data for peer institutions that participate in the project and for consortia of institutions to share more detailed data.

The EDUCAUSE Core Data Service (*http://www.educause.edu/coredata/*) collects data on information technology environments and practices on member campuses and provides a web-based interactive database service available to all who complete the survey. Participants can use data contributed by their peers to help benchmark, plan, and make IT decisions. The first Core Data Service (CDS) survey was launched in December 2002 and the survey is now conducted annually, from January through March, always capturing data from the previous fiscal year, with those data made available through the interactive database service by May of that year. A campus must complete and submit the annual survey to retain or gain access to the CDS database service.

ENDNOTES

[1] R. Van Horn, "Academic Computing: How Much Is Enough?", presentation at the Seminar for Academic Computing Services, Snowmass, CO, August 4, 1980.

[2] Carnegie Classifications: BG = Baccalaureate - General, BLA = Baccalaureate - Liberal Arts, Masters = Masters I or Masters II. See *http://www.carnegiefoundation.org/Classification/* for a detailed explanation of Carnegie Classifications.

[3] The average headcount totals for employees + students for the institutions described in this paper are: BG–1,603, BLA–2,609, Masters–3,826.

[4] Network wiring (fiber, copper cable) will also need replacement but its useful lifetime is longer than the interval before most buildings will undergo renovation. Wiring replacement usually takes place as part of building renovation projects.

[5] Campus Computing Project Survey 2002, *http://www.campuscomputing.net*

[6] Summary of the 37th annual report, titled, "The American Freshman: National Norms for Fall 2002," published by the UCLA Graduate School of Education and Information Studies and reported at *http://www.gseis.ucla.edu/heri/02_press_release.pdf*, January 27,2003.

[7] *(http://www.carnegiefoundation.org/Classification/CIHE2000/Tables.htm)*

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