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So, What Does IT Cost?

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Overview

Assessing the total cost of information technology (IT) in a college or university has long been an important—and elusive—goal. Many institutions and collaborative projects have approached this challenge for pragmatic reasons, especially in an attempt to address recent questions about the value of IT.[1] Spending for IT takes place in academic, administrative, and service departments across campus as well as in central IT organizations. Costs are embedded in obvious information technologies (desktop computers, servers, network gear, telephones, printers, scientific instrumentation, production equipment, and so forth); in systems, software, firmware, middleware, and licenses for these devices; in maintenance contracts; in contracts and research grants; and, of course, in personnel. Assessing the "cost" of personnel in relation to IT can be tricky, especially when relying on definitions that reside in human resources (HR) enterprise resource planning (ERP) systems. Measuring the costs of full-time IT workers might be straightforward, but discovering the cost of faculty members, noncentral system and service managers, and administrative personnel throughout the institution who devote a portion of their time to supporting IT can be a daunting exercise.

In 2004, the Massachusetts Institute of Technology (MIT) and Stanford University embarked on a joint project to develop a methodology to measure, or at least estimate, the total cost of IT at those two institutions. After decades of making significant investments in IT, both institutions needed mechanisms to assess the performance of IT in relation to its cost, as well as to understand how the institutions compared to other universities and by what measures. In a 2004 *EDUCAUSE Quarterly* article, Stanford and MIT detailed a joint effort to benchmark university IT help desk services (Dougherty, Clebsch, & Anderson, 2004). This help desk benchmarking study laid the foundation for collaboration and comparison between the two universities on the broader project of measuring costs for all IT systems and services. The Total Cost of IT project borrows liberally from the overall methodology of the help desk benchmarking study. By involving some of the same participants, the Total Cost of IT project ensured ongoing continuity and built on existing relationships between the schools and the staff.

This bulletin describes the project costing model, processes, and findings, and the ways this model can be replicated on other campuses. It explains how to categorize spending, which questions to ask, how to manage and analyze results, and how to extract a meaningful picture of IT spending. It can also provide a tool for schools to use to respond to questions in the annual EDUCAUSE Core Data Survey (http://www.educause.edu/coredata/) about overall IT spending.

Highlights of the Total Cost of IT Project

In 2002, an external visiting committee reviewed MIT's IT services. Its analysis was hampered by the absence of detailed cost data for IT activities and useful benchmark data from peer institutions. At the same time, Stanford wanted to collect data about a spectrum of IT-related issues: customer satisfaction, employee performance and satisfaction, costs, and process and project performance. As frequent collaborators, the

two institutions decided to approach their challenges together in order to reach the shared goal of collecting useful quantitative data and the additional goal of being able to benchmark each institution's services against the other.

The MIT Total Cost of IT project team included the vice president, the senior financial officer, and the senior consultant for client support R&D for Information Services and Technology (IS&T). The Stanford project team included the executive director for strategic planning, the technical operations coordinator, the assistant director of Finance, and the financial manager for Information Technology Systems & Services (ITSS). To measure how much IT spending was taking place in the central IT departments (IS&T and ITSS) as well as in schools and departments in support of teaching and learning (academic), research, and general administration, the combined project team choose to measure one year of expenditures representing fiscal year 2004. They postulated that once they found out where and how much spending was taking place, they could build a rational model for how IT spending should occur at each institution and be able to compare the results across institutions.

Methodology

For this project, each institution allocated two staff members for roughly three full months of work over the course of a year to design the project, collect the data, perform the analysis, and prepare the results.

- **Define the problem.** What does it mean to come up with "a number" for the total cost of IT? The team explored which comparisons besides the total amount would be of interest and concluded that the following subtotals would be meaningful:
  - spending by organizational hierarchy
  - spending by IT cost category
  - spending by purpose
- **Analyze the organizational structure.** Acknowledging that there are inevitably some unique structures in each institution that are important to explore, the team identified both shared and unshared organizational hierarchies. Using this logic, they chose the school and vice president levels as the natural division to examine, since that would produce a manageable data set that could be analyzed and compared across institutions. MIT's Lincoln Laboratory and the Stanford Linear Accelerator Center (SLAC) have large spending patterns, but they were "odd ducks" for this project. As a result, the federally funded, independent research centers were omitted from the study.
- **Inventory the data and systems to draw upon.** Each institution examined which of its systems contained the core data, as well as which parts of the organization would be examined at the line-item level for IT spending and which would be considered "IT Shops" and rolled in at the aggregate level. The team made the following determinations:

- Use HR systems to identify the staff effort and costs that fit the definitions of IT spending. Subtotal these along organizational boundaries.
- Use the ERP system to identify all the line-item transactions that comprise IT spending. Obtain the line items at the most disaggregated level possible and then roll them up to the necessary level of subtotal along organizational boundaries.
- Use the data warehouse to extract current chart of accounts information across all organizational units. Cost objects, profit centers, or organizational units that are devoted entirely to IT were flagged as IT Shops, and all of their spending was captured and included in the IT spending total.
- Determine where and how to allocate special cost types: depreciation, capital projects, service center revenues, revenues from internal chargebacks, and so forth, as defined and treated by the different institutions. For example, telephone and network infrastructure upgrades and enhancements, as well as software development, are capitalized expenses at MIT. As such, they include only the annual depreciation and interest expense rather than the entire capital outlay.
- Maintain interinstitution alignment on how to classify and aggregate the myriad special cases that will be uncovered. There may be no right answer for certain expense types, but be sure that each campus handles them in the same way. The team had several midproject conferences to go over these issues as they were discovered.

- **Extract data to support estimates of spending by cost category.** The task was to merge the best HR data with the ERP data, ensuring that salaries in the IT Shops were not double-counted.
- **Create and apply rules to estimate spending by purpose.** The project sponsors established a table of rules that the team used to allocate each subtotal according to its purpose: IT spending in support of academics, research, teaching and learning, or administration.
- **Organize the detailed data into tables for presentation and comparison.** From the start of the project, the team planned to build high-level charts and graphs to present the data it collected.[2]

A Benchmarking Approach: Data Definitions

McCormick and Bergland (1997), leaders of the University of Virginia's Cost of Services Model project, said, "The most important aspects of obtaining valid information in this process are the identification and definition of services and the associated cost components." This concept was echoed in the MIT/Stanford IT help desk benchmarking efforts, and the Total Cost of IT project team knew that a first step was to develop a shared understanding of the time frame for the study and which costs would be considered as included in the project.

Time Frames and Snapshot

MIT's data set for this project was drawn from spending that took place between July 1, 2003, and June 30, 2004, which corresponds to MIT's 2004 fiscal year. Stanford's data set for this project was drawn from spending that took place between September 1, 2003, and August 31, 2004, which corresponds to Stanford's 2004 fiscal year. Methodologically, MIT took a snapshot of the cost objects[3] in the financial system on July 13, 2004, since the list of active cost objects changes frequently. They used the chart of accounts for fiscal 2004 and included cost objects that were "effective" and "not terminated" during the year. At MIT, roughly 150 of the 41,600 cost objects related to the central IT department. MIT's IT Shops were represented in total, while only IT spending categories were counted for other organizations. They are organizations that are either devoted wholly to IT (such as IS&T, Student Services & Technology, OpenCourseWare, Academic Media Production Services, and the Center for Advanced Educational Services) or that include a defined IT component (such as the Media Lab: Network Systems Operations, Arts@MIT Web Site Publications Project, and Athletics Departmental Computing).

Data Sets and Costs to Measure

The project team identified which costs it would measure and from where it would obtain its data.

- **Detailed spending from the ERP system.** Line-item transactional data was drawn from institutional ERP systems. MIT's data warehouse was considered to be the main source of financial transactional data, but it lacked the "long text description" of purchase orders, which is vital to resolve ambiguous transactions.
- **Salaries, wages, and benefits from HR.** Salary data was supplied by MIT's HR department, which was interested in working on this project in order to refine the algorithm for determining which staff at MIT should be considered "IT employees." Employee benefits were computed using the benefit rate in effect during fiscal year 2004.
- **Organizational hierarchy from the data warehouse.** Descriptive data about the cost objects is not maintained in the ERP system. To understand the purpose of a cost object and how it rolls up inside the department/school hierarchy, MIT extracted master data information from its data warehouse.
- **Spending by organizational unit.** MIT's study included all organizational units listed in SAP under "Organizational Hierarchy." This hierarchy does not include Lincoln Laboratories, a federally funded research entity. Stanford did not include its federally funded Stanford Linear Accelerator Center. The process design assumed that the schools would be able to identify spending by cost object, then link each cost object to its fundamental organizational unit, and finally roll up the subtotals into progressively higher levels of aggregation. The best level of aggregation proved to be the "School" or "Area" level—such as the "School of

Engineering" or the "Vice President for Human Resources"—comprising multiple departments and usually headed by a dean or a vice president.

- **Spending by category.** MIT and Stanford spent considerable time coming to agreement on the type of spending to include. Overall, IT expenses included:
  - staff working 50 percent time or more supporting others who use computers, or had that responsibility in their job titles (especially true for sponsored research staff doing programming or database administration);
  - all computing equipment, including peripherals such as scanners, digital still and video cameras, printers, plotters, and so on;
  - contractors or outside professional services performing IT functions such as Web design, desktop computer support, database administration, network cable installation, and so forth; and
  - all expenses, including non-IT personnel, travel, and professional development for IT Shops.

  Spending was divided into the following six broad categories:

  - Salaries, wages, and benefits
  - Contracts; outside consulting
  - Software
  - Equipment
  - Network; telecomm
  - Other

  Spending in these categories was based on the general ledger account code assigned to each transaction. Since it was important to capture not only the gross total spending but also the flow of revenue related to expenses, the team captured the total budget by including gross total spending (the sum of the categories above); internal revenue (some departmental spending in the categories above show up in another MIT organization as internal revenue); and net total spending (gross spending minus revenue).

  The team agreed that IT spending would be filtered to exclude the following, except when such expenses were being paid from an IT Shop:

  - salaries of individuals who use computers simply for routine office productivity and clerical data entry, as well as graduate student wages to support computer labs or provide support to departmental administrative staff;
  - office equipment, such as copiers and furniture, including computer desks; and

- all computing expenses involved in research “about” computing, such as research that might be undertaken in the departments of computer science or management information systems.

- **Spending by purpose.** Often there is no official designation of spending by purpose in the financial or organizational hierarchy. For this project, and with the acknowledgement that some allocations could be open to interpretation, spending was categorized in one of the following ways:
  - *Academic costs.* These costs included the nonresearch IT spending of academic departments within the schools of the university. Honoring the idea that residing at the university is an essential part of a full academic life, IT spending in support of “life at the academy” is also included. At MIT these units include the Dean for Student Life and the Dean for Undergraduate Education.
  - *Teaching and learning costs.* These costs included spending in support of the academic mission by administrative units, such as central IT organizations and a portion of the libraries.
  - *Administrative costs*. These costs included all central administrative offices except as already allocated to teaching and learning. Researchers did not attempt to tease out the portion of an academic department that is really administrative (as in the case of dean or department head who also teaches a class or two).
  - *Research costs.* At MIT, sponsored research is usually represented by a specific type of cost object in SAP and is therefore easily identifiable. Research spending within academic departments is likewise easy to distinguish from other academic IT spending. MIT’s labs and centers are generally “research” by default, and a portion of the libraries is allocated to research as well. At Stanford, sponsored research expenditures are not identified within the accounting system. Thus, the allocation between “research” and “academic” was based on annual data studies conducted by the University Cost & Management Analysis group for cost pool statistics.

Recording Matrix

The tool represented in Figure 1 is the surface layer of a set of linked spreadsheets that held and summarized the detailed financial data for each organizational unit. A hierarchy of underlying spreadsheets aggregated line-item transactions by cost object and general ledger account, sifted them for qualifying IT expenses, and removed the double-counting of some IT Shop expenses. The overall approach was to retain but hide the detailed financial data and present only the most interesting overall summaries and ratios, such as spending by purpose. It is also possible to summarize along other dimensions, or to use data not shown here, such as spending as a percentage of the budget at the departmental level or spending per faculty member, per employee, and so on.

Figure 1. Cost of IT Aggregate Layer

General Cost Structure			Academic	Teaching and Learning	Research	Administrative
People		←				
Equipment		←				
Software		←				
Contracts		←				
Telecomm		←				
			↑	↑	↑	↑
Explicit Detail						
People			Academic	Teaching and Learning	Research	Administrative
IT Professional Staff						
Staff Benefits						
Staff Support						
Mgmt/Administration	only for IT Shops					
Student Labor						
Student Benefits						
Equipment						
All computers and peripherals—purchase, lease, rent						
Technical equipment						
Amortization on computing capital equipment						
Software						
Software acquisition contracts						
Software maintanance agreements						
Contracts						
Equipment maintenance contracts						
Outside service providers of IT						
Telecomm						
Network						
Telephone						
Amortization on infrastructure and network equipment						
↑						
Line Item Detail per Organization						

Project Success Factors

MIT and Stanford believe that the success of the Total Cost of IT project is attributable to a variety of factors related to institutional commitment, thorough planning and execution, and reasonable, tangible, useful deliverables. The following factors were essential to successfully studying the total cost of IT:

- Achieving an in-depth understanding of each university's financial and organizational structure.
- Defining normalized transactional data to ensure meaningful apples-to-apples comparisons between institutions.
- Establishing a consistent methodology for isolating and characterizing IT costs throughout the university.
- Assigning a project team that included finance and IT operational participants.
- Obtaining full access to the ERP transactional spending records.
- Collaborating with HR to gather IT salary and position data.
- Committing sufficient resources to gather, qualify, and summarize the data.

The results are intended to provide an estimate of total IT spending, accurate within +/- 10 percent, a margin of error that would still be able to inform high-level decision making. The line-item details are known precisely, of course, but the uncertainty about whether all line items were captured justifies rounding off the result.

The team discovered that involvement of senior officials in the schools, labs, and centers would have been necessary if the goal were to achieve 100 percent accuracy, and their involvement will be more critical in subsequent refinements of numbers that were not readily apparent in the normal accounting structure—specifically, salaries of research staff who are really doing IT work.

Even among large research universities, comparing the results between two institutions is probably about 80 percent possible as a result of the different institutional missions. Some schools, such as engineering, humanities, and business, are common to Stanford and MIT, while some are unique to one institution, such as Stanford's medical school. Spending by type can be mapped more closely, but it is necessary to adjust for some differences in accounting philosophy. For instance, MIT considers telephones an IT expense but, for the purposes of this study, Stanford did not include it as such. These differences emerge as the project team drills down into the data in certain places; at higher levels of aggregation, interesting comparisons are possible.

What It Means to Higher Education

Goldstein (2004) set a context for the importance of understanding the total cost of IT. He described the mid- to late-1990s as a time of unprecedented levels of technology

spending, during which higher education institutions implemented new high-speed networks and deployed new enterprise computing applications. These investments were made during a national economic boom that was fueled, at least to some extent, by the promise of technology as a transformative force. When the dot-com bubble burst, many institutions began to reevaluate whether prior investments in ERP systems and instructional technology were realizing their promised benefits. While today's analysis of the value of information technology might be more measured and realistic, it is often being conducted in a climate of careful data analysis. Although the need for such analysis is undisputed, the tools available for these projects are typically not "tuned" for financial analysis and projections. The MIT/Stanford Total Cost of IT project provides a replicable model through which higher education can calculate the total cost of technologies and services that have become fixtures in our institutions.

Key Questions to Ask

- To what degree does our institution understand the total cost of IT and services?
- What commitments is our institution willing to make to understand these costs?
- How does the total cost of IT impact our long-term strategic initiatives?
- What is the "right" amount of spending for IT?
- How does our institution's IT spending compare with that of our cohort institutions?

Where to Learn More

- MIT Information Services and Technology. MIT/Stanford "Total Cost of IT" project. Retrieved May 11, 2006, from http://web.mit.edu/costs/

References

- Dougherty, J. D., Clebsch, W., & Anderson, G. (2004). "Management by fact: Benchmarking university IT services." *EDUCAUSE Quarterly, 27*(1), 14–23. Retrieved May 11, 2006, from http://www.educause.edu/ir/library/pdf/eqm0413.pdf
- Goldstein, P. (2004). *Information technology funding in higher education* (Research Study, Vol. 7). Boulder, CO: EDUCAUSE Center for Applied Research, p. 9. Available from http://www.educause.edu/ecar/
- McCormick, S., & Bergland, V. (Fall 1997). "Technology costs: Under the magnifying glass," *Virginia.edu*, *1*(2). Retrieved May 11, 2006, from http://www.itc.virginia.edu/virginia.edu/fall97/costs/.http://www.itc.virginia.edu/virginia.edu/fall97/costs/costs_linkA.html

Endnotes

1. See, for example, the EDUCAUSE Core Data Service at <http://www.educause.edu/coredata/>; the COSTS Project at <http://www.costsproject.org/default.htm>; and McCormick & Bergland's *Virginia.edu* article at <http://www.itc.virginia.edu/virginia.edu/fall97/costs/all.html>.
2. Some project presentations are available at <http://web.mit.edu/costs/draft/presentations.html>.
3. Cost object at MIT refers to accounts or cost collectors representing organizational units, projects, and so forth.

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