

Key Findings

Alternative IT Sourcing Strategies: From the Campus to the Cloud

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Few higher education IT organizations do it all themselves. The breadth of technology and services that institutional IT organizations maintain requires equally broad staff skills and resources. Many find it advantageous to enlist third-party providers to work alongside institutional staff. Although the total outsourcing of institutional technology organizations is rare, so is the total self-operation of all functions and services.¹

Advancements in networking have broadened the third-party options available to IT organizations. Outsourcing once required an on-site presence by a contractor to oversee a service. This traditional form of outsourcing has given way to models that leverage the abilities of the Internet to deliver technology or services directly to institutions. For much of the last decade, IT organizations have been able to lease software over the Internet (software as a service, or SaaS) or contract with a third party to provide remote hosting of applications. This has broadened outsourcing options and provided institutions with opportunities to more rapidly deploy technology and better manage risk through remote redundancy.

Cloud computing is the most recent extension of outsourcing models. Although its underlying concepts are familiar, its proposition and promise outpace earlier models of Internet-enabled sourcing such as application service providers (ASPs) and SaaS. Cloud computing provides institutions with the opportunity to envision technology infrastructure as a flexible, scalable service that can be procured on demand. It offers the promise of leveraging large economies of scale to reduce the cost of computing. Cloud computing is also potentially a much more environmentally sustainable model for computing. The ability to locate cloud resources anywhere frees up providers to move operations closer to sources of cheap and renewable energy.

More choice, however, has brought more complexity. The growing breadth of institutional sourcing options requires IT leaders to evaluate more options and providers. The decision is not simply one of identifying who can do it cheaper or who has the better technology. Cloud-based sourcing models add additional layers of consideration, such as where institutional data will be stored and how secure it will be. The cloud also complicates the outsourcing decision-making process. Cloud computing places the ability to outsource directly in the hands of an individual user and threatens to disintermediate the institutional IT organization.² Individuals with a computer and an Internet

connection can conceivably look to the cloud for the remainder of their computing needs, from storage and computing cycles to e-mail and other applications.

Our study of higher education's use of alternative sourcing confirmed that it is seen as a useful but not transformative option. Despite the hype surrounding strategies like cloud computing, study participants reported targeted adoption to meet focused needs. Whereas adoption is broad if measured by the technology and service areas in which some form of alternative sourcing is used, it is also shallow. The extent of its use to provision IT services is relatively modest, and few respondents viewed alternative sourcing as their strategic direction. Respondents who outsource saw alternative sourcing as a means to fill gaps in skills, gain flexibility, or keep technology current. With the possible exception of student e-mail outsourcing, few respondents saw it as a strategy to contain IT costs. In fact, a favorable outlook of institutional executive leaders in general and IT leaders in particular toward outsourcing seemed to have a larger influence in adoption decisions than many other potential drivers.

Expectations are that adoption of cloud computing and other forms of sourcing will grow, but that growth will continue to be modest. Concerns about data security and institutional culture are expected to limit growth for many. Finally, a minority of study respondents self-operate everything and expect to continue doing so. These respondents have confidence in their own IT capabilities and see alternative sourcing as lacking compelling benefits.

Our research confirmed that IT organizations face complex decisions about how to best engage alternative sourcing options in ways that leverage their benefits and protect the institution's interests. They must also create policies and processes that help individuals make effective sourcing decisions. All of this must be done within a fluid environment in which technological changes, maturing provider offerings, and changing institutional circumstances (e.g., economic crisis) can alter their assessment of risks and benefits.

Defining Alternative Sourcing

In establishing the boundaries for this research, we were quite cognizant that outsourcing for most institutions is a decision made repeatedly for individual services. In fact, we intentionally steered away from the term *outsourcing* because our goal was to study a set of choices much broader than the traditional interpretation of outsourcing. We chose the term *alternative sourcing* to define what we studied because it encompassed different types of providers and solutions.

We defined alternative sourcing to be the range of options institutions have for providing technology services or operating technology functions aside from doing it themselves. It included traditional outsourcing of all or part of the IT organization; accessing externally managed applications, development environments, or hardware via the Internet; and incorporation of contractors and consultants as part of the IT organization to routinely deliver IT functions or services. It encompassed an equally broad range of provider types, including corporations, other institutions, consortia of institutions (e.g., open-source), associations, and government or other nonprofits.

Our definition of cloud computing was also broad. We considered any technology or service delivered to an institution or individual via the Internet to be a cloud service. The breadth of this definition included on-

demand infrastructure (e.g., Amazon Elastic Compute Cloud), SaaS applications (e.g., Salesforce.com or Gmail), and on-demand development environments (e.g., Coghead).³ It also included more traditional services such as institutions accessing remote data centers via the Internet for disaster recovery.

Methodology

Our study of alternative IT sourcing consisted of the following:

- a literature review of outsourcing, cloud computing, and related topics to identify issues and frame questions;
- consultation with higher education IT leaders through a focus group conducted at the annual ECAR symposium to help frame hypotheses and provide insights into the barriers and drivers associated with alternative sourcing;
- a quantitative web-based survey of EDUCAUSE member institutions that received 372 responses;
- qualitative interviews with 20 senior IT leaders representing institutions that self-operate everything as well as those who used alternative outsourcing for multiple technologies and services; and
- two case studies looking at the use of alternative sourcing at Thomas Jefferson University and Oakland University, and a third, multi-institutional case study that examines lessons learned from the outsourcing of e-mail.

Key Findings

Our research focused on why and how institutions use alternative sourcing. We looked at the utilization of alternative sourcing by technology function and service as well as the adoption of 11 specific types of cloud and non-cloud-based alternative sourcing. The study also included more detailed evaluations of outsourcing student and faculty/staff e-mail and the use of contractors and consultants within the central IT organization. Finally, we reported on the experiences of respondents with self-selected examples of their institutions' adoption of alternative sourcing. The questions in our survey covered

- how respondents perceive the risks and benefits of alternative sourcing;
 - the role that institutional IT goals, policy, culture, and executive outlook play in influencing adoption of alternative sourcing;
 - the use of alternative sourcing by technology function, service, and type (cloud or non-cloud);
 - the role that institutional energy conservation goals and the need to control IT costs have in shaping adoption of alternative sourcing;
 - the motivations of respondents at institutions that self-operate all IT functions and services; and
 - respondents' perception of the effectiveness of alternative sourcing.
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In the following section we summarize our main findings.

Broad but Shallow Adoption

The vast majority of respondents used some form of alternative sourcing. In fact, only 16.1% of respondents reported having no external service providers. The remainder, including three institutions that outsourced all IT functions and services, used alternative sourcing for one or more technologies or functions. Use of alternative sourcing spanned many technologies and services. In fact, at least 5% of respondents who outsourced reported using alternative sourcing for 25 out of the 27 possible technology or service areas we included in the survey. Interestingly, there were no technology or service items that a majority of respondents reported using alternative sourcing to obtain (Table 1).

Table 1. Use of Alternative Sourcing, by Technology or Service Area (N = 309)

Area	Percentage of Respondents who Outsource
Cabling	42.4%
Learning management system	42.1%
Electronic journals	35.6%
Administrative systems (HR, finance, student)	33.7%
Training	30.7%
Alumni/development systems	29.4%
E-mail	29.1%
Web development	28.2%
Telecommunications	25.2%
Hot or cold alternative IT sites	19.7%
Applications development	19.7%
Collaboration tools	18.8%
Disaster recovery	17.8%
Networking	14.9%
Help desk	13.6%
Desktop hardware repair	13.3%
Calendar	12.6%
Specialized research applications	9.1%
Data center management	8.7%
Server management	8.4%
Project management	7.4%
Data storage	6.5%
Research administration systems	5.8%
Office productivity tools	5.5%
Information security management	5.5%
Desktop support	4.9%
Information security applications	4.5%

Among the 11 specific types of alternative sourcing we researched (i.e., modes of delivery versus area of technology or service being delivered), the most prevalent was software as a service. SaaS was adopted by 49.8% (N = 309) of the respondents who outsourced. None of the other types was used by more than 20% of respondents who outsourced. Several of the cloud-based types of alternative sourcing, including cloud-based servers, storage security applications, and software development environments, were used by 10% or fewer of respondents who outsourced.

Although most respondents used alternative sourcing, the extent of its use for major technology areas was fairly shallow. We asked respondents who used alternative sourcing to rate the extent of their use in four technology areas: learning technologies, enterprise applications, infrastructure, and user services and support. On a 5-point scale (with 1 = not at all and 5 = all aspects), mean responses ranged between 1.69 and 2.29. Learning technologies had the highest mean use of alternative sourcing, and user services and support the lowest.

Influence of Leaders' View

Adoption of alternative sourcing appeared to be influenced by the respondents' (in most cases the senior-most IT leaders') view of alternative sourcing. Those who reported views that were inclined toward outsourcing (that is, they viewed it as a strategic or tactical alternative) also reported using alternative sourcing for more technology or services areas. Those respondents with views of alternative IT sourcing that could be characterized as disinclined toward outsourcing (that is, they viewed it as an alternative to be used on an exceptional basis or not at all) reported using alternative sourcing for fewer areas.

Interestingly, we found no relationship between institutional type, including Carnegie classification, student enrollment, and control, and the number of technology or service areas for which a respondent used alternative sourcing. Likewise, the pressure faced by a respondent's institution to reduce energy consumption or reduce IT costs also bore no relationship to the number of areas for which alternative sourcing was employed.

Anticipated Changes in Adoption

Respondents who outsource anticipated that their use of alternative IT sourcing would increase in the next three years. However, the anticipated growth among the 11 specific types of alternative sourcing we included in the research was not aggressive. Respondents' mean assessment of anticipated growth ranged between 3.14 and 3.76 (using a 5-point scale with 1 = greatly decrease and 5 = greatly increase). This placed respondents' average expectations between utilization that would stay the same and increase (Table 2). Anticipated increases in adoption for these 11 types were higher among respondents who believed more strongly that alternative IT sourcing reduces IT costs. A similar, though weaker, relationship was observed between anticipated increases in adoption and respondents' personal belief that alternative IT sourcing helps to improve IT service.

Table 2. Anticipated Change in Adoption of Alternative Sourcing Strategies

Alternative Sourcing Strategy	N	Mean*	Std. Deviation
Application software via the Internet (SaaS)	295	3.76	0.536
Internet or cloud-based storage	282	3.58	0.593
Internet or cloud-based servers	277	3.48	0.593
Internet or cloud-based software development environments	272	3.28	0.511
Contract with a third party to operate a help desk (e.g., call center)	279	3.27	0.520
Internet or cloud-based security applications	269	3.21	0.459
Primary data center provided by a third party	284	3.18	0.506
Contract with a third party to provide ERP project management	288	3.18	0.547
Contract with a third party to provide desktop computing support	279	3.17	0.445
Contract with a third party to provide network design	291	3.16	0.482
Contract with a third party to manage network operations	285	3.14	0.448

Q: How is your institution's adoption of the following alternative sourcing strategies likely to change in the next three years?

**Scale: 1 = greatly decrease, 2 = decrease, 3 = stay the same, 4 = increase, 5 = greatly increase*

Interestingly, we also observed a statistically significant relationship between respondents' assessment of institutional IT outcomes and their plans to expand adoption. Respondents who anticipated increased adoption of multiple types of alternative IT sourcing averaged lower agreement that they were achieving positive IT outcomes at the time of the survey. These results suggest that some respondents saw alternative sourcing as part of their technology improvement strategy.

Respondents who outsource agreed most strongly that future adoption would enable their institution to access critical IT expertise. There was a nearly equivalent level of mean agreement that alternative IT sourcing would help their institution meet user expectations for technology capabilities.

Comparatively fewer respondents (40.8% of those who outsource) agreed or strongly agreed that their institution's future engagement with alternative sourcing would help to contain future IT costs.

Respondents who outsource also saw potential barriers that they would need to overcome if they were to increase their use of alternative sourcing. Specifically, respondents agreed on average that their future adoption would be limited in the next three years by data security concerns (mean 3.83), institutional culture (mean 3.58), and regulatory compliance concerns (mean 3.57). Additional factors with mean agreement slightly above neutral (using a 5-point scale with 1 = strongly disagree and 5 = strongly agree) were ability to manage contract terms, technology issues, and lack of support from institutional executives.

Self-Operators

Although they were a minority (16.1%), we did find respondents who reported self-operating all aspects of their institutional technology. The profile of these respondents did not differ significantly from that of respondents who outsourced. Respondents' primary reason for self-operating was their view that alternative IT sourcing benefits are too few in light of their perception of the risks and costs. Nearly three-quarters of respondents who self-operate (44 total respondents) selected the cost-effectiveness of self-operation as a top-three reason for choosing to self-operate. Similarly, 39 respondents selected insufficient benefits of outsourcing. Data security and data privacy risks were among the top-three reasons for 15 respondents who self-operate.

Self-operators would consider outsourcing if they saw changes that would alter their perception of its risks. Among nine factors, self-operators agreed most strongly (mean of 3.57 on a 5-point agreement scale) that in the future their institution would be more likely to employ alternative IT sourcing if offerings in the market became more mature. The formation of more institutional consortia to provide services (3.48) and providers offering more evidence that they can secure data (3.42) received similar levels of agreement. Interestingly, the mean agreement was slightly below neutral that a significant cut to the IT budget and rising energy costs would cause self-operators' institutions to become more likely to employ alternative IT sourcing.

Respondents' Use Cases

We included in the survey a set of questions asking respondents to describe the motivations, decision-making process, and outcomes for an adoption of alternative sourcing with which they were familiar. Because they were self-selected, the use cases are not necessarily representative of the respondents' experience with alternative sourcing. Nor are they a representative sampling of any particular kind of alternative sourcing. However, they do provide insight into how and why respondents chose to use alternative sourcing.

Respondents reported on uses of alternative sourcing that were important to their institutions. More than half of the 303 respondents who provided use cases indicated that it would have a high or very high impact on their institution if the technology or service they reported on were to fail. Use cases were also diverse, spanning more than 25 areas of technology or technology services. Half involved the delivery of a technology or service via the Internet. Use cases revealed several interesting findings:

- Respondents on average rated improving IT services and enabling staff to focus on higher priorities as the goals that were most important to their decision to adopt alternative sourcing. Respondents also rated making technology more reliable and bringing technology up to date as important goals.
- The relative importance of the goals differed somewhat, depending on the areas of technology in which the case study fell.
- The barriers respondents most frequently identified that they needed to overcome to implement their use cases were data privacy risks, data security risks, the cost-effectiveness of self-operation, and resistance to change within the IT organization.

- A greater proportion of respondents with use cases that involved cloud-based services reported that data privacy risks and data security risks were among their top-three barriers to overcome.
- Respondents reported engaging more stakeholders in their sourcing decision for use cases that had a higher impact of failure.
- Respondents reported relatively low levels of difficulty negotiating 12 different aspects of their agreement with their use case provider.
- Respondents on average reported between fair and good levels of performance (using a 5-point scale with 1 = poor and 5 = excellent) for 10 different outcomes of their use case (Table 3).

Table 3. Respondents' Assessment of Use Case Performance

Area	Mean*	Std. Deviation
Enable IT staff to focus on higher priorities (N = 285)	3.48	1.102
Make technology reliable (N = 284)	3.37	0.999
Bring technology up to date (N = 282)	3.34	1.000
Maintain data privacy (N = 254)	3.22	0.952
Enhance user satisfaction (N = 277)	3.19	1.089
Secure data (N = 256)	3.19	0.968
Reduce risk (N = 254)	3.17	1.018
Reduce energy consumption (N = 194)	2.97	1.187
Improve access to technical or managerial expertise (N = 248)	2.88	1.069
Reduce IT costs (N = 268)	2.67	1.226

Q: Please rate the performance of your alternative IT sourcing provider in the following areas:

**Scale: 1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent*

Sourcing E-Mail

In the past several years, free cloud-based mail services for higher education offered by vendors such as Google and Microsoft have generated considerable interest within the higher education IT community. Although we found that the predominant strategy among respondents for sourcing student e-mail is still self-operation, we also found evidence that institutions are becoming more willing to employ alternative sourcing. Nearly a quarter of respondents (24.7%) have engaged a commercial provider to host their primary student e-mail, and 93.5% of these said they were using one of the free commercial services. Commercially hosted student e-mail was more prevalent among associate's and doctoral institutions (Table 4). The impact of Google's and Microsoft's offerings can also be seen in respondents' reasons for outsourcing. Respondents most frequently stated that reasons for outsourcing student e-mail were to reduce IT costs (70.0% of those who outsource student e-mail), to enhance functionality (69.0% of e-mail outsourcers), and to enable staff to focus on higher priorities (56.0% of outsourcers). This emphasis on reducing costs contrasted with our results relating to other areas of alternative sourcing, in which respondents seemed either skeptical that cost reductions could be achieved or were more concerned with improving service or enabling staff to focus on higher priorities.

Table 4. Host of Primary Student E-Mail, by Carnegie Classification

Host	DR (N = 72)	MA (N = 91)	BA (N = 92)	AA (N = 41)	Other (N = 58)
Institutional provider	65.3%	78.0%	82.6%	46.3%	86.2%
Commercial provider	34.7%	22.0%	17.4%	53.7%	13.8%

Although most outsourcing decisions were fairly recent, respondents were generally satisfied with the performance of their hosted student e-mail. Respondents who outsourced student e-mail assessed nine dimensions of performance and rated each on average between good and very good. The highest-rated average performance was for making technology more available, enabling IT staff to focus on higher priorities, and bringing technology up to date. Each of these had a mean performance of close to 4 (very good) on a 5-point scale. Respondents reported fairly good performance in the two areas that were most frequently selected as drivers of their decision to outsource: reducing IT costs and enhancing functionality. Both of these items had mean performance ratings between good and very good. Finally, in the categories of “maintain data privacy” and “secure data,” performance was rated as closer to good than very good.

For the majority of respondents who do not outsource their primary student e-mail, the primary reasons were a lack of compelling benefits and data privacy and security concerns. Lack of compelling benefits and data privacy concerns were identified by nearly half of respondents who don't outsource as among the top three reasons their institution has not adopted third-party hosting.

Relatively few respondents (4.8%) have adopted commercially provided third-party hosting for faculty and staff e-mail. Respondents who self-operate were fairly consistent in their reasons for self-operation. Nearly three-quarters (73.4%) identified data privacy risks, and 63.9% identified data security risks as being among their top-three barriers to adopting third-party hosting for faculty/staff e-mail. Among respondents who self-operate faculty/staff e-mail, 21.7% reported that it was likely or highly likely that their institution would move to third-party hosting in the next three years. We caution against concluding from this data point alone that we are on the cusp of accelerated adoption of outsourcing for faculty/staff e-mail, because three years is a long time horizon and respondents were expressing an intention, not a decision.

Contractors and Consultants

The final type of alternative sourcing we analyzed was the use of contractors and consultants by respondents' central IT organizations to routinely deliver IT functions and services. The majority of respondents (56.7%) did not regularly employ any consultants or contractors as part of their central IT organization. Of those respondents who did, 70.8% said that contractors and consultants constituted between 1% and 10% of the total central IT staff FTE. There was some evidence to suggest that the use of contractors and consultants is more prevalent at institutions that are predisposed toward other forms of alternative sourcing. Respondents whose views were inclined toward alternative IT sourcing (that is, those who saw it as a strategic or tactical option) were more likely to use contractors and consultants than respondents who were disinclined toward alternative sourcing. Likewise, respondents who used more of the 11 specific forms of alternative sourcing (listed earlier in Table 2) were also more inclined to use contract labor.

There were few other meaningful differences between users and nonusers of contract labor. The one exception was the strategic importance to the central IT organization of making labor costs more variable. The majority of respondents who use contract labor (52.5%) agreed or strongly agreed that making labor costs more variable is of strategic importance. In comparison, 26.6% of respondents who did not use contract labor agreed or strongly agreed with this same statement.

Although users of contract labor were attracted by the financial flexibility it provides them and the ability to add required skills, nonusers were dissuaded by their perception that contractors and consultants increase IT costs. This was identified by 67.8% of respondents who are not using consultants and contractors as one of their top-three reasons. The next most frequently identified reasons for not using contractors and consultants were its inconsistency with institutional culture (30.3% of nonusers) and the difficulty finding qualified consultants and contractors (29.4% of nonusers).

We asked respondents to report the extent to which they use consultants and contractors in a dozen areas or functions commonly found in an IT organization. Across all areas, contractors and consultants were reported to be a small portion of the total workforce. Not surprisingly, their use was more extensive in areas that are relatively common across IT organizations and industries, such as user support, database administration, web development, systems administration, and application development and maintenance. They were not used as extensively in less common areas, such as academic computing, IT administration, research computing, and executive leadership.

Both respondents who used and those who did not use contract labor have maintained a consistent approach for the last three years. Both groups are likely to continue their current course into the future, with users of contract labor anticipating some increase in the portion of their central IT workforce that contractors and consultants will constitute.

Summary

Adopting alternative sourcing was a useful but not yet a transformative strategy for respondents. Although many use it in multiple places and forms, it is a primary method of delivering IT services for relatively few. Adopters viewed it as a beneficial strategy for plugging gaps in skills or making technology more current. With some exceptions, it was not viewed as a means to significantly reduce IT costs. To date, the impetus for adoption seemed driven largely by the interests and outlook of IT leaders.

Those respondents who have adopted alternative sourcing rated performance as satisfactory. This was evident both in the use cases self-selected by respondents and the experience of respondents who outsourced student e-mail and who used contractors and consultants. Respondents who outsourced anticipate incremental growth in their use of alternative sourcing. However, data privacy and data security concerns are barriers that respondents still believe they will have to overcome and may delay their adoption. These barriers, along with a greater confidence in their own IT capabilities, have also led self-operators to stay away from alternative sourcing. They are likely to hold this position unless providers can demonstrate greater evidence of the benefits of their offerings and the measures they have taken to secure institutional data.

Respondents were understandably cautious in their approach to alternative sourcing in general and cloud computing in particular. However, it is important that caution not become complacency. Although cloud computing may be at the zenith of its hype cycle, some would argue that it has a chance to live up to a significant portion of its promise.⁴ It could prove shortsighted to dismiss its potential to enable institutions to reduce the costs of providing some commodity technologies, gain flexibility, and enable IT staff to focus on higher priorities. All of these outcomes are of paramount importance during times of severe budget constraints. Complacency would also be a mistake in light of the cloud's ability to enable individuals to make their own sourcing decisions. Institutions that fail to develop a well-articulated position on how and when to adopt cloud computing risk having their strategy defined by the collective adoption decisions of individual faculty, students, and staff.

Alternative sourcing has a place in the IT organization of the future. The degree to which it is present will depend on institutional strategy and outlook as well as the continued maturation of solutions. Right now, we are in a period of transition and uncertainty. Should cloud computing achieve its promise and cloud providers demonstrate their ability to secure data, rapid growth in adoption would likely follow. On the other hand, it would take only one or two highly visible data security incidents to cause organizations to move aggressively back to self-operation.

IT organizations' conservatism toward alternative sourcing is understandable, but such an attitude risks complacency. Beyond the hype, there are benefits to be realized from alternative sourcing that may be critical to institutions as they seek ways to withstand significant budget cuts. Complacent IT organizations risk losing control of the sourcing discussion and decision making at their institution. The nature of cloud services removes the sourcing decision from the IT organization and places it in the hands of divisions, departments, or individuals. We are not that far away from a department with a university procurement card being able to go online to buy its storage, backup services, server capacity, and even admissions software (think SaaS, CRM solutions). This does not even consider individuals who are already using the cloud's free solutions for e-mail and office productivity. Proactive IT organizations have an opportunity to shape these decisions by becoming advisers to their institutions on where and how the cloud can benefit them. They can create prepackaged options of cloud services for users to choose from as a means to maintain both influence and a more secure and manageable IT environment. Passive IT organizations risk trying to support bad sourcing decisions after they have been made or clinging to policy or control of the network as the only means to shape behavior.

Institutions should prepare for a future that includes a greater use of alternative sourcing. Sound preparatory actions include developing an accurate accounting of the costs of self-operating services that might one day be outsourced. Taking steps to further adopt standards throughout the technology stack and developing expertise in systems integration would better position an institution to more effectively incorporate technologies from a broader set of providers. Likewise, building greater expertise in contract negotiation and management will make IT organizations more adept at sourcing decisions and better partners for their sourcing providers. Finally, IT leaders must lead their institutions to develop a sourcing strategy that particularly addresses the role of the cloud. They must prepare their organizations to guide and influence individual as well as institutional decision making. Given the fluidity of technology and the provider marketplace, this is likely to be a continuous conversation.

Endnotes

1. Brian L. Hawkins and Julia A. Rudy, *Core Data Service Fiscal Year 2007 Summary Report* (Boulder, CO: EDUCAUSE, 2007), 25.
2. Ronald Yanosky, "From Users to Choosers: The Cloud and the Changing Shape of Enterprise Authority," *The Tower and the Cloud: Higher Education in the Age of Cloud Computing* (Boulder, CO: EDUCAUSE, 2008), 130, <http://www.educause.edu/thetowerandthecloud>.
3. McKinsey & Co. and SandHill Group, *Enterprise Software Customer Survey 2008* (SandHill Group, 2008), 6, http://www.mckinsey.com/clientservice/hightech/pdfs/Enterprise_Software_Customer_Survey_2008.pdf.
4. Daryl Plummer et al., *Gartner's Top Predictions for IT Organizations and Users, 2008 and Beyond: Going Green and Self-Healing* (Stamford, CT: Gartner, January 8, 2008).

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