

# 7

## The Central IT Organization and Research

*Never in the field of human conflict was so much owed  
by so many to so few.*  
—Winston Churchill

### Key Findings

- ◆ Slightly more than half of responding central IT organizations had less than 1 FTE dedicated to the support of research, with an additional 23 percent having 1 to 3 support FTE. One-quarter of Research Essential institutions had less than 1 FTE assigned to the support of research.
- ◆ Three-quarters of research-focused (Research Essential and Balanced) institutions had fewer than seven people from central IT assigned to support the entire institution.
- ◆ Thirty-eight percent of central IT organizations expected to increase their research IT staff over the next three years, double the 19 percent that had increased their staff in the previous three years.
- ◆ Approximately 45 percent of Research Essential and Balanced institutions had a unit within central IT dedicated to supporting the research community.
- ◆ Institutions committed to research are more likely to have a constellation of features that include an executive overseeing research, a distinct unit within central IT dedicated to research support, and greater funding for research-related IT support.
- ◆ Over the past three years, most of the money spent specifically on research went to data storage, operations, and high-performance networking. Respondents expected these three categories to continue to receive the greatest amount of funding over the next three years.
- ◆ Half of respondents maintained that they do not have a sustainable budget model for research IT infrastructure or for services related to research IT.
- ◆ Respondents perceive that researchers are generally satisfied with the infrastructure and services provided by central IT.

The central IT organization has a wide range of responsibilities, of which research support is only one element. Isolating the research component within IT units is made especially difficult by the multiple areas of overlap between research and other academic pursuits. Time spent configuring the network, for example, benefits instruction, administration, and research. Similarly, the upgrade to a course management system will have its most direct impact on classroom teaching but may also add value to the exchange of information between researchers. The compartments separating IT activities, therefore, are not watertight, and we must be careful at the outset not to treat research as a fully discrete and isolable function within IT.

That said, however, we still wanted to gain an understanding of how central IT units organize, staff, and fund their support of research. We focused on four questions:

- ◆ How many staff FTE are focused on researchers' needs?
- ◆ Do central IT organizations have a unit dedicated to the needs of researchers, and if so, what does it do?
- ◆ How large are the budgets that central IT organizations allocate to the support of research, and what are the sources of those funds?
- ◆ How effective do the central IT organizations perceive themselves to be in the support of research?

## Staffing

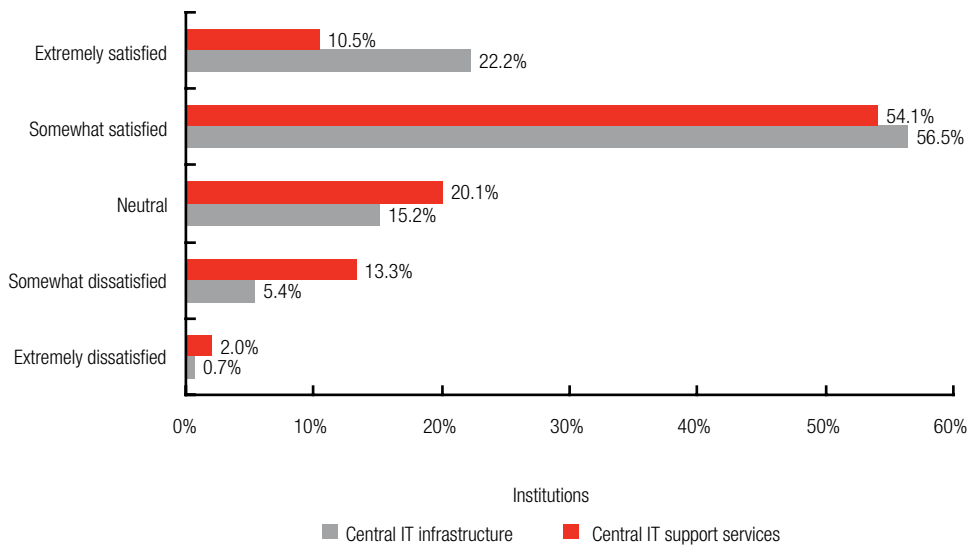
We asked how many FTE staff within central IT were currently assigned to the support of research (Table 7-1). Among the 310 institutions responding, over half (55.9 percent) had less than one FTE, and an additional 23.2 percent had between one and three FTE dedicated to research support. About one-fifth (20.9 percent) had four or more FTE, with 13 (4.2 percent) reporting more than 20 FTE.

As one would expect, there was a significant association between the size of the central IT staff focused on research and the institution's expressed commitment to research. Of the 27 Carnegie-classed (that is, non-Canadian, nonsystem) institutions having seven or more FTE dedicated to the support of research, 22 were from doctoral universities. A more inclusive and telling picture comes from a cross-tabulation of staffing and institutional mission, as shown in Figure 7-1.

The central IT organizations at the more research-intense institutions were more likely to have bigger research-related staffs, with 10 of 45 (22.2 percent) Research Essential and 20 of 88 (22.7 percent) Balanced institutions having seven or more such staff. In both cases, therefore, about 22 percent of these two categories of schools had seven or more research-related IT staff in their central units. Corresponding figures were two of 107 (1.9 percent) for the Teaching Favored and one

**Table 7-1. Central IT FTE Assigned to Research Support**

Number of FTE	Percentage of Institutions	Number of Institutions
Fewer than 1	55.9%	173
1–3	23.2%	72
4–6	10.3%	32
7–10	4.8%	15
11–20	1.6%	5
More than 20	4.2%	13



**Figure 7-1.**  
**Central IT Staff**  
**Dedicated to**  
**Research Support,**  
**by Institutional**  
**Mission**

of 68 (1.5 percent) for the Teaching Essential institutions. Among the Teaching Favored institutions, 69.2 percent had less than one FTE; the corresponding figure among the Teaching Essentials was 91 percent. Not surprisingly, a commitment to research comes with a commitment of staffing resources.

Still, it is worth noting that 11 (24.4 percent) of the Research Essential institutions had less than one FTE assigned to research, and an additional 24 (53.3 percent) had one to six staff. Among the Balanced institutions, 25 (28.4 percent) had fewer than one research IT FTE, and an additional 43 (48.9 percent) had one to six. This means that 77.7 percent of the Research Essential and 77.3 percent of the Balanced schools had fewer than seven people assigned to research in their central IT organizations.

The EDUCAUSE Core Data Service (CDS) (Hawkins, Rudy, & Nicholich, 2005) provides a similar perspective. Looking across Carnegie classification, the average number of FTE staff in the central IT organization dedicated to research and academic computing was 2.3. Moving across the classifications, we find a distinct difference between doctoral institutions (6.7 FTE) and master’s (1.4 FTE),

bachelor’s (0.6 FTE), and associate’s (1.0 FTE) institutions. Both this report’s survey data and the EDUCAUSE CDS tell a similar story, with the research-focused institutions having more staff dedicated to research and academic computing.

To understand staffing trends, we asked respondents whether the number of central IT staff who supported research had decreased or increased over the past three years, and whether they anticipated a decrease or increase over the next three (Figure 7-2). None of the institutions reported that research-related IT staff had “greatly decreased” over the past three years, and none expected the number to “greatly decrease” over the coming period. At the same time, only around 2 percent of institutions claimed that such staff had “greatly increased” or would “greatly increase.” Still, there was some expectation that there would be an “increase” in the number of research-related IT staff over the next three years. While 18.8 percent of institutions reported that they had experienced an increase in staff over the prior three years, double that number (38 percent) anticipated an increase in such staff over the next three years.

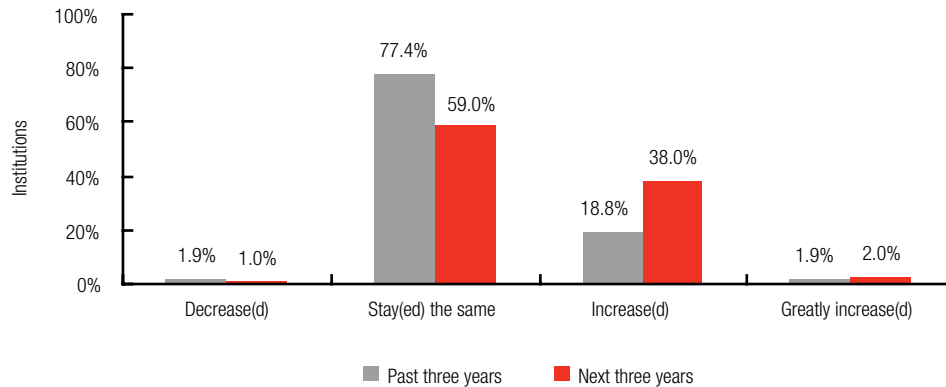
Correlating staffing with institutional mission, we found small but statistically significant differences across the four mission categories when we compared reported staffing increases for both the past and the next three years (Figure 7-3). All mission categories, for both past and future three-year periods, fell comfortably within the range of “stay(ed) the same” to “increase(d).” But as we move from the Research Essential to the Teaching Essential institutions, we see a distinct change: the research-focused institutions show larger increases in staff growth over the past three years, with Research Essential institutions exhibiting a mean of 3.45 and Teaching Essential institutions a mean of 3.03 for the past three years.

### Research IT Units

Having staff to support research is one measure of commitment. Another is having a specialized unit within central IT dedicated just to research support. Our survey therefore asked if the central IT organization has “a distinct unit with the explicit mission of supporting faculty, clinicians, or other researchers with their research needs.” Of the 321 institutions that responded to the question, 90 (28 percent) had such a central unit, while 231 (72 percent) did not.

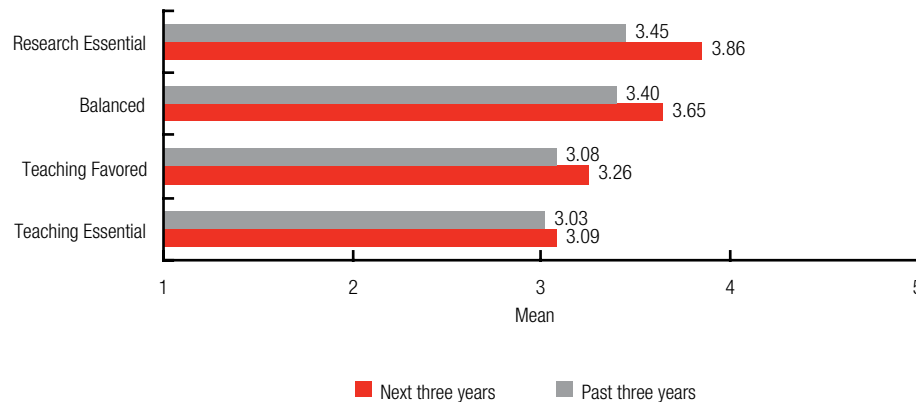
There was a strong association between the presence of a research unit and an institution’s research mission. As shown in Figure 7-4, almost half of both the Research

**Figure 7-2.**  
Changes in Central  
Research IT  
Support Staffing,  
Past and Next  
Three Years

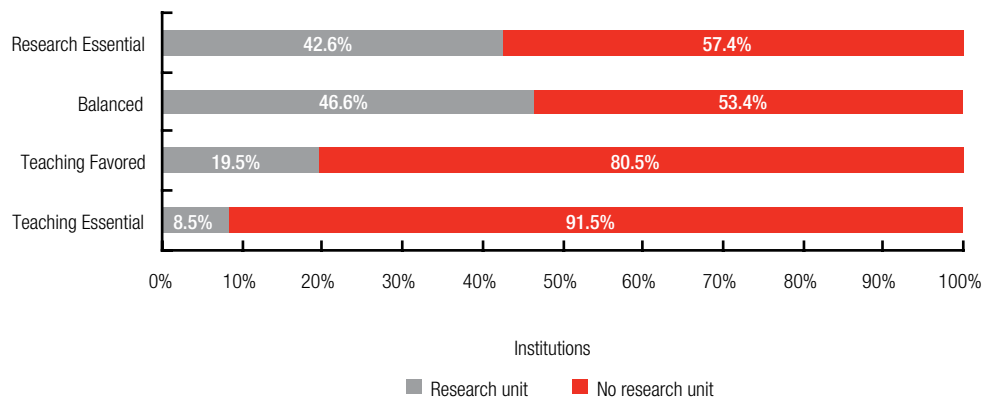


**Q:** In the past (next) three years, the number of central IT staff who support research has (is expected to):  
(1 = greatly decrease(d), 2 = decrease(d), 3 = stay(ed) the same, 4 = increase(d), 5 = greatly increase(d))

**Figure 7-3.**  
Growth in Central  
IT Research  
Support Staff,  
by Institutional  
Mission (Mean  
Values)



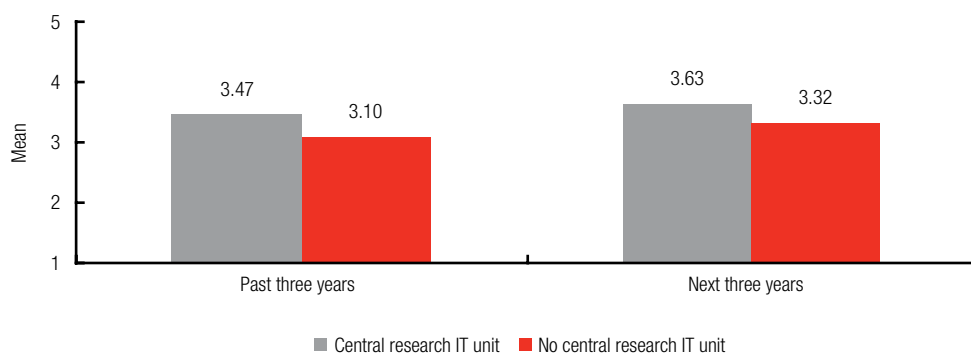
**Q:** In the past (next) three years, the number of central IT staff who support research has (is expected to):  
(1 = greatly decrease(d), 2 = decrease(d), 3 = stay(ed) the same, 4 = increase(d), 5 = greatly increase(d))



**Figure 7-4.**  
Presence of Research Unit in Central IT, by Institutional Mission

Essential and the Balanced institutions have a research IT unit, compared with only a fifth of Teaching Favorees and less than one-tenth of the Teaching Essentials. The slightly larger percentage of Balanced institutions with a central research IT unit may seem incongruous, but it highlights a phenomenon that we will note frequently through the survey data: the great similarity in organizational structures and behaviors between the Research Essential and the Balanced institutions. We believe this is the case because whatever the differences in their espoused *teaching* missions, a commitment to research triggers required investments in the research enterprise if the institution is to be effective. As with central IT staff dedicated to research (and with infrastructure, as we saw in Chapter 6), this seems to be the case with the presence of a research unit within central IT.

Those institutions with a dedicated cadre of IT research support staff exhibited other characteristics as well. They claimed a substantially higher level of formal engagement with researchers (see Chapter 9), and a modestly higher (self-reported) level of researcher satisfaction with the infrastructure and support services (see this chapter, below). They were also more likely to view themselves positively; while only 28 percent of all institutions had a dedicated unit, one-half (48 of 97) of the institutions reporting a world class or excellent reputation for academic research had one. We noted that universities with a stronger research focus exhibited a small but significant tendency to increase research-related staff faster than other categories of institutions. Analysis (Figure 7-5) showed that institutions with a central IT unit dedicated to supporting researchers also showed a higher propensity to increase staff.



**Figure 7-5.**  
Growth in Central Research IT Staff, by Presence of Central Unit

**Q:** In the past (next) three years, the number of central IT staff who support research has (is expected to): (1 = greatly decrease(d), 2 = decrease(d), 3 = stay(ed) the same, 4 = increase(d), 5 = greatly increase(d))

## Funding

Research and IT independently constitute two of the most expensive components of the academic enterprise. Put them together and you have an opportunity to spend a lot of money. We sought to understand how research-related IT is funded within the central IT organization.

The first—and in some ways most difficult—question to address is the amount of money being spent. Much of the infrastructure is multipurpose, with the network, for example, being used for downloading everything from research data to course syllabi to administrative data. Assigning costs to one category of academic life or another can thus be artificial. That said, and to gain insights into the order of magnitude of the funding, we asked respondents how much money, independent of multipurpose infrastructure, the central IT organization spends on infrastructure and services related to research. We knew the responses (Table 7-2) would be inexact, but they proved illuminating.

Nearly 80 percent of respondents reported that they allocate \$500,000 or less centrally to infrastructure and services related to research. This does not sound like much money—and it isn't. The ECAR study on IT funding (Goldstein,

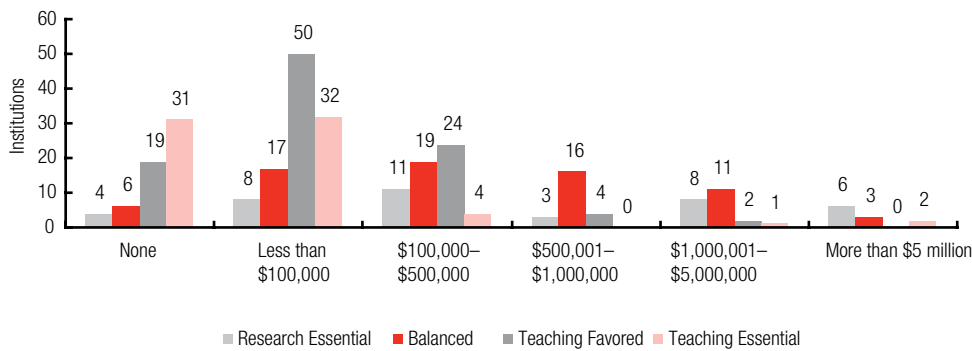
2004) provides independent evidence that CIOs regard the allocation for research IT as inadequate. That study asked survey respondents questions related to the adequacy of IT funding levels in four areas: administrative computing, academic/research computing, data communications, and instructional technology. For both key questions—are funding levels sufficient to meet strategic technology objectives, and are they sufficient to keep pace with technological advancements—academic and research computing was consistently rated as least sufficient by both public and private institutions.

The level of funding, predictably, is related to institutional mission (Figure 7-6). Only 10 percent and 8 percent of Research Essential and Balanced institutions, respectively, claimed no specific allocations for central IT research support, while the comparable percentages for the Teaching Favored and the Teaching Essential schools were 19 percent and 44 percent, respectively. At the other end of the spectrum, the research-focused institutions were much more likely to spend a million dollars or more: Research Essential, 35 percent; Balanced, 19 percent; Teaching Favored, 2 percent; and Teaching Essential, 4 percent.

**Table 7-2. Central IT Spending on Research Infrastructure and Services**

Budget	Percentage	Number	Cumulative Percentage
None	21.6%	61	21.6%
Less than \$100,000	37.8%	107	59.4%
\$100,000–\$500,000	20.5%	58	79.9%
\$500,001–\$1,000,000	8.1%	23	88.0%
\$1,000,001–\$5,000,000	8.1%	23	96.1%
More than \$5 million	3.9%	11	100.0%

**Q:** Independent of infrastructure that is multipurpose (e.g., network, e-mail services), approximately how much money does the central IT organization spend on infrastructure and services related to research? (1 = none, 2 = less than \$100,000, 3 = \$100,000 to \$500,000, 4 = \$500,001 to \$1,000,000, 5 = \$1,000,001 to \$5,000,000, 6 = more than \$5,000,000)



**Figure 7-6.**  
Central IT Spending on Research Support, by Institutional Mission

Institutional mission was not the only organizational characteristic that exhibited a strong relationship with funding level. Others included the existence of a distinct unit within central IT dedicated to research and the presence of an institutional vice president or vice chancellor for research. The higher-funded institutions were also more likely to have claimed a larger increase in the level of data-intensive research. It would be difficult, and perhaps fruitless, to try sorting out causal relationships among these variables. Does the presence of a vice chancellor for research, for example, have a seminal role in directing more resources into research-related IT? Possibly, although more likely a constellation of variables—including an executive overseeing research, a dedicated central IT unit, and greater spending on research-related IT support—together and cumulatively manifest an institutional commitment to research. How this constellation evolved is most likely specific to each institution.

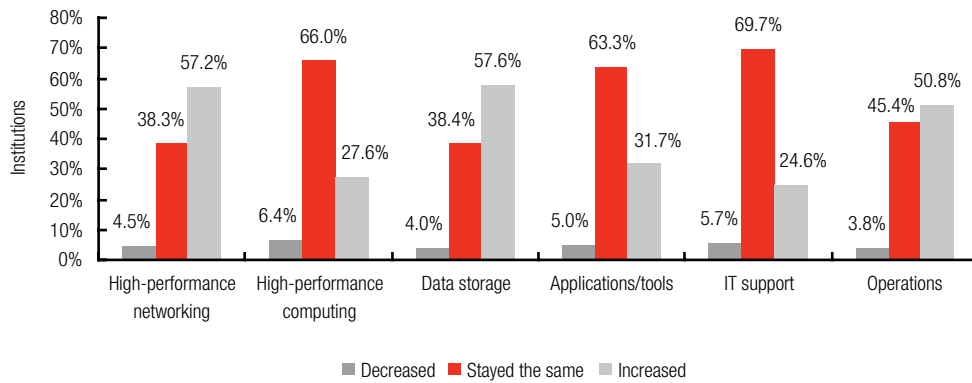
Aggregate budgets are important, but they do not tell us where people are spending their money and, by extension, what their priorities are. We asked survey participants to tell us where there have been spending increases or decreases over the past three years, and how they expect spending to change over the next three years. We divided these questions into two categories, each with three technology elements:

- ◆ Infrastructure:
  - ❖ High-bandwidth networking
  - ❖ High-performance computing
  - ❖ Data storage
- ◆ Support and services:
  - ❖ Applications and tools (such as visualization, display, and statistical analysis)
  - ❖ Research-related IT support (such as training and consulting)
  - ❖ Operations (such as security, data protection, and facility management)

Figure 7-7 shows the percentage of institutions reporting increases or decreases in central IT funding over the past three years within each of the six categories. Institutions saw funding grow the most in data storage (57.6 percent of reporting institutions). As we will note in the next chapter, this is entirely consistent with respondents' view that data storage was experiencing the fastest growth among the infrastructure elements. Following data storage, the next highest growth areas were high-performance networking (57.2 percent) and operations (50.8 percent). Funding grew the least in applications and tools (31.7 percent), high-performance computing (27.6 percent), and IT support (24.6 percent). There was no statistically significant relationship with institutional mission, most likely reflecting a common set of pressures and priorities across categories.

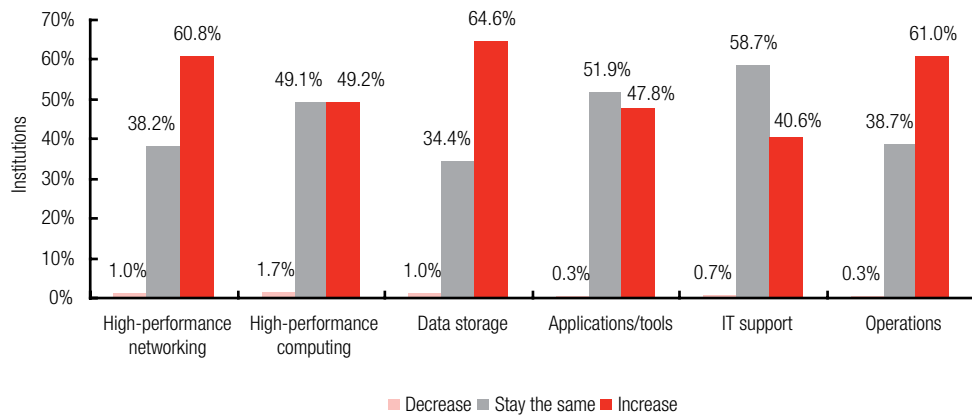
Looking ahead to the next three years (Figure 7-8), respondents once again said that the three areas with the most anticipated

**Figure 7-7.**  
Change in Central  
IT Funding,  
Past Three Years,  
by Technology  
Element



**Q:** In the past three years, how has central IT funding changed for the following technology elements? (1 = greatly decreased, 2 = decreased, 3 = stayed the same, 4 = increased, 5 = greatly increased)

**Figure 7-8.**  
Change in Central  
IT Funding,  
Next Three Years,  
by Technology  
Element



**Q:** In the next three years, how is central IT funding for the following technology elements expected to change? (1 = greatly decrease, 2 = decrease, 3 = stay the same, 4 = increase, 5 = greatly increase)

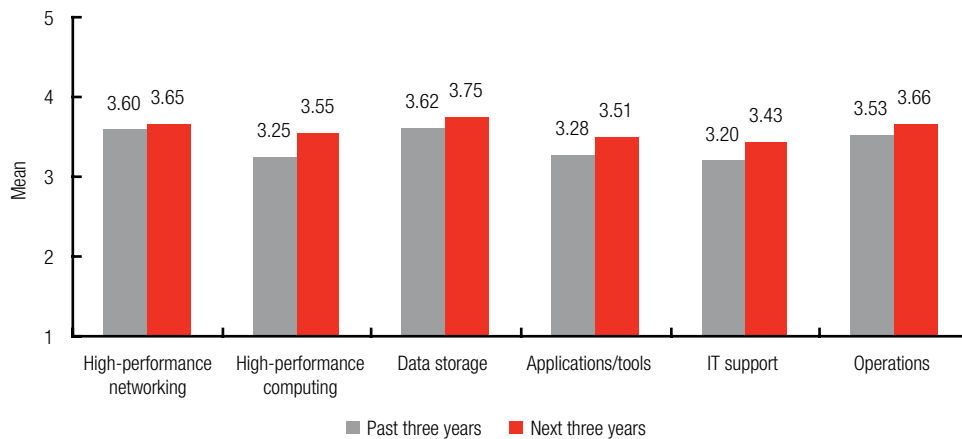
growth in funding would be data storage (64.6 percent of institutions), operations (61.0 percent), and high-performance networking (60.8 percent). They expected that IT support, consisting of training and consulting, would continue to trail, with just 40.6 percent of institutions expecting any kind of increase in funding to that area.

Another way to view these data is to look at the overall means generated by the question of past and future funding, with 1 indicating “greatly decrease(d),” 3 denoting “stay(ed) the same,” and 5 equaling “greatly increase(d).” From this perspective, as Figure

7-9 shows, respondents expect modest increases in each of the six categories over the next three years.

These findings lead to the following question: If central IT had more money to allocate to research-related IT, in which areas would they invest? Survey respondents were given four categories of investments and asked to choose the one in which they would invest if they had more discretionary budget.

As Table 7-3 shows, even if there were fewer real-world constraints, infrastructure would still rule. The more surprising number is the second-place showing of training and



**Figure 7-9.** Growth in Central IT Funding for Technology Elements, Past and Next Three Years (Mean Value)

**Q:** In the past three years, how has central IT funding changed for the following technology elements? (1 = greatly decreased, 2 = decreased, 3 = stayed the same, 4 = increased, 5 = greatly increased)

**Q:** In the next three years, how is central IT funding for the following technology elements expected to change? (1 = greatly decrease, 2 = decrease, 3 = stay the same, 4 = increase, 5 = greatly increase)

**Table 7-3. Investment Preferences**

Technology Element	Percentage Responding
Expanding infrastructure (networks, computation, and data storage)	46.0%
Providing research-related IT support (e.g., training and consulting)	20.8%
Offering applications and tools (e.g., visualization, display, statistical analysis)	17.9%
Enhancing operations (e.g., security procedures, licensing support, facility management)	15.3%

consulting, consistently at the bottom of the pile in actual funding for both the past and the next three years. This elevation perhaps reflects that training and consulting get short shrift when bumped against the realities of running an IT operation. Significantly, too, this distribution did not vary meaningfully with any of the usual suspects, such as institutional mission, Carnegie class, size of institution, or size of the IT budget. In the absence of any variable with which it is associated, we might conclude that the data reflect the common pains and wishes of IT organizations everywhere.

As noted in the ECAR IT funding study (Goldstein, 2004), "IT budgets have become consumed by fixed costs." Between 70 and 90 percent of IT budgets go to full-time per-

sonnel costs and contractual commitments to vendors, limiting the amount of discretionary money available for new investments in, for example, research-related services and support. Significantly, that study found that there was less flexibility in larger institutions, which are the ones more likely to have a commitment to big research.

The constraints on investment in central IT research-related items are further highlighted by the results of this study, in which we asked respondents for the primary source of funding for six technology categories: high-bandwidth networking, high-performance computing, data storage, applications and tools, research-related IT support, and operations. Three types of funding mechanisms were listed: central IT

budget, chargebacks for usage, and set fee for set scope of services. Figure 7-10 shows the responses among those institutions that provide each of the services. The overwhelming majority of technology elements were financed from the central IT budget, which does not allow for increases in funding from user fees or higher demand. To the contrary, it means that research-related IT must compete with a host of other priorities, such as security and administrative systems.

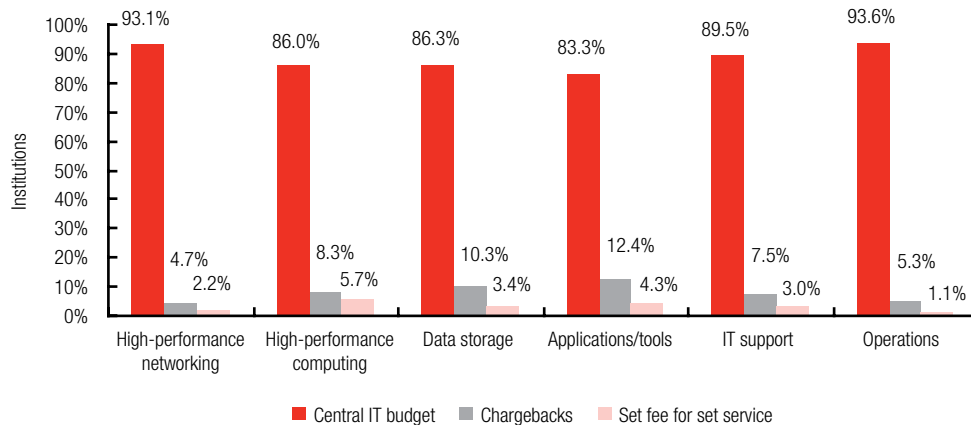
We also sought to discover the extent to which IT leaders believe they have a sustainable budget model for maintaining and evolving key components of the infrastructure and for services (such as applications, tools, training, and consulting) related to research IT. As shown in Table 7-4, a large percentage

of respondents contend they do not have sustainable models in either area. Half (49.9 percent) did not have a sustainable budget model for infrastructure, while 54.5 percent maintained that the budget for services was unsustainable.

The funding constraints were confirmed by the CIOs' perceptions of the major barriers inhibiting greater investment in research-related IT (Figure 7-11).

Each respondent was allowed to choose up to two responses from a predetermined list, and by far the greatest perceived barrier was the lack of institutional funding, with 57 percent of respondents citing it as one of their two greatest barriers. The second most cited barrier was "higher IT priorities," which at its core is also a resource issue. The third was

**Figure 7-10.**  
How Technology Elements Are Financed



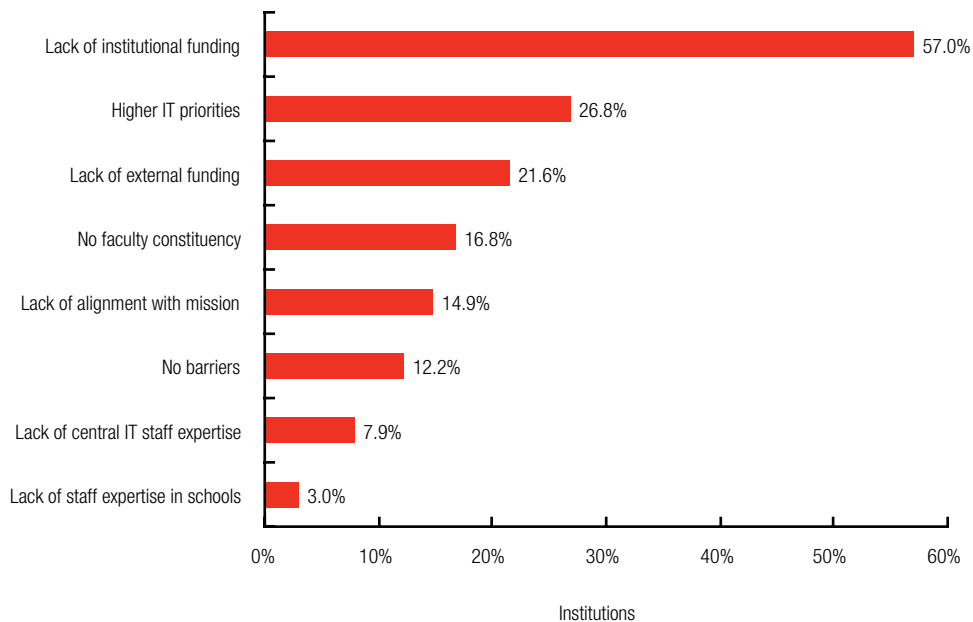
**Table 7-4. Sustainable Budget to Support Research IT**

	Infrastructure	Services
Disagree	49.9%	54.5%
Neutral	15.3%	18.1%
Agree	34.8%	27.4%

**Q:** This institution has a sustainable budget model for maintaining and evolving key components of the research IT infrastructure, such as the high-performance network, high-performance computation, and data storage

**Q:** This institution has a sustainable budget model for maintaining and evolving services related to research IT, such as applications, tools, training, consulting, and operations

(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)



**Figure 7-11.**  
Barriers to Investment in IT Research Support

the “lack of external funding.” Clearly, when asked why they were not doing more, CIOs have money on their minds.

Together, these factors—small research IT budgets, lack of flexibility, reliance on allocated budgets, and perceived paucity of funding—lead once again to questions about how well equipped central IT organizations will be to support the development of their cyberinfrastructure.

### Perceptions of Effectiveness

Within the context of these constraints, how effectively do central IT organizations believe they meet researchers’ needs? Of course, asking people to rate their own performance always runs the risk of overt or unconscious bias. Still, such questions provided a means for us to gauge the level of urgency and priority for further investment and activity. We therefore asked two sets of questions. The first was, “How would you rate your IT infrastructure in terms of its ability to support research?”

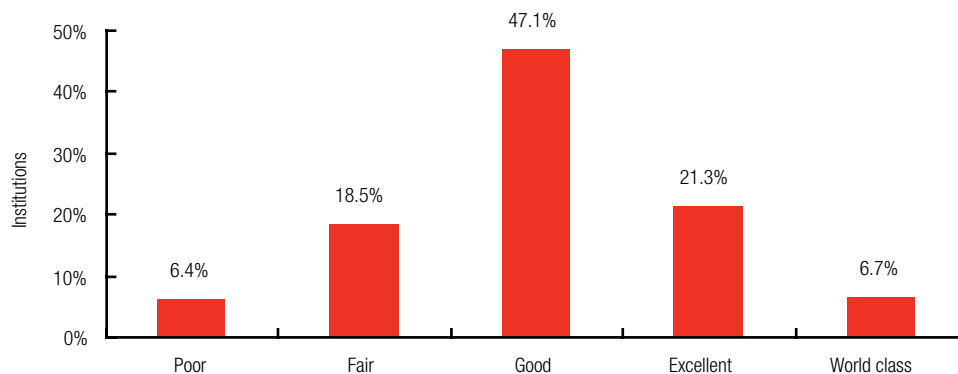
Addressing first the reported satisfaction with infrastructure, the responses, as Figure 7-12 shows, produced almost a perfect bell curve.

When we analyzed the ratings of infrastructure by mission, an interesting pattern developed (Figure 7-13). For three of the mission categories, the distribution still followed the bell curve. The exception was the Research Essential institutions, which tended to describe themselves more on the world-class or excellent end of the spectrum. Again, we are aware of the biases that can creep into such self-reported data, but we still find it interesting that 23 of the 48—or almost half—Research Essential institutions answering this question described their institution’s infrastructure as good, fair, or poor. We suspect that because the Research Essential institutions are more focused on their research support, they have higher standards by which they evaluate their infrastructure.

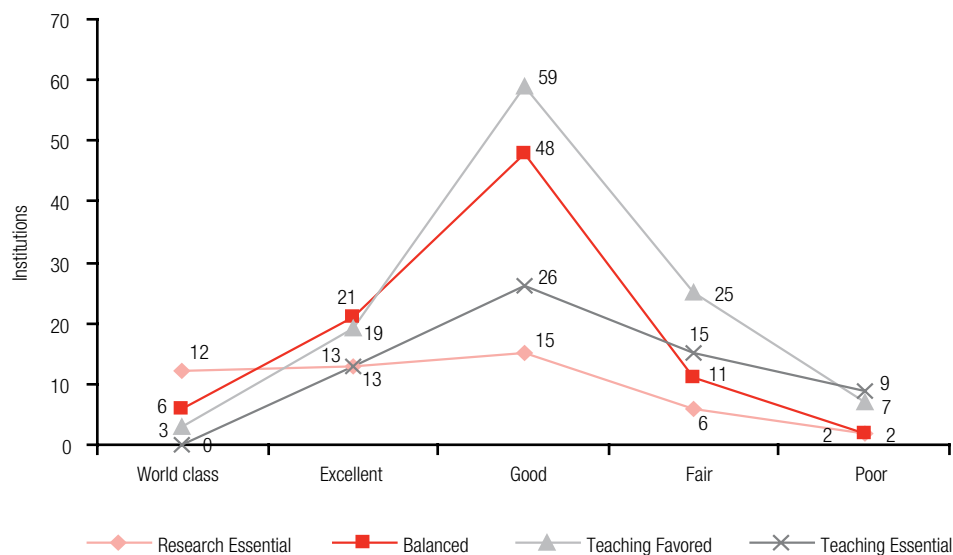
The second set of questions addressed how satisfied the respondents think researchers are with the services the central IT organization provides:

- ◆ How satisfied do you think researchers are with the IT infrastructure provided by the central IT organization for their research activities?

**Figure 7-12.**  
How Institutions  
Rate Their  
Infrastructure



**Figure 7-13.**  
Rating of Infrastructure,  
by Institutional  
Mission

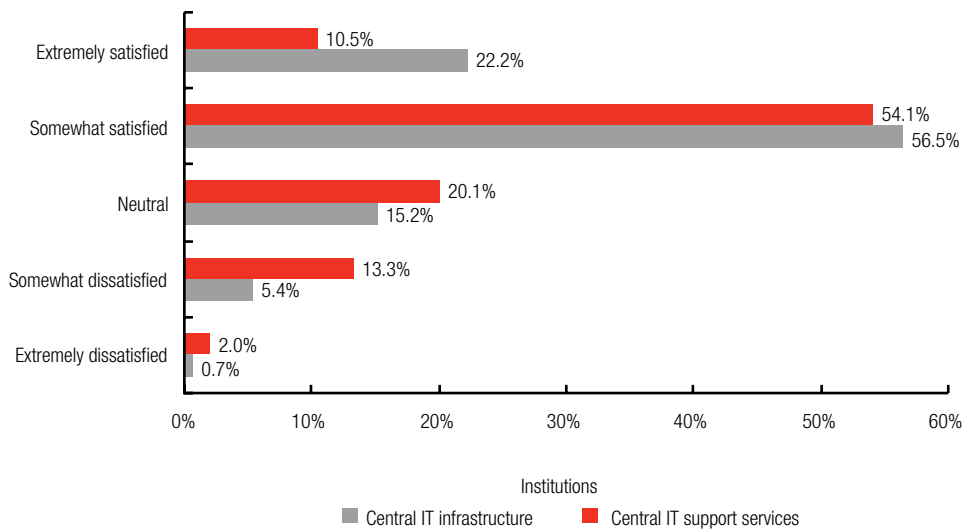


- ◆ How satisfied do you think researchers are with the IT support services provided by the central IT organization for their research activities?

As shown in Figure 7-14, 78.7 percent of respondents perceived that the researchers in their institutions were extremely or somewhat satisfied with the infrastructure provided by central IT; two-thirds (64.6 percent) claimed similar levels of satisfaction with services. The lower perceived satisfaction (and concomitantly higher dissatisfaction) ratings on the service side should not be surprising, given what we discussed earlier about the higher level of spending on infrastructure. It also reflects, as

we will see in a later chapter, that many of the research-related services are provided not by central IT but by a local IT unit; it is likely that respondents scored themselves lower on services because they do not provide them.

Beyond their intrinsic value as a barometer of researcher opinion, these data are interesting for another reason as well: it is not clear what factors are associated with researcher satisfaction. There is a weak association between the presence of a dedicated research IT unit within central IT and satisfaction with the support services provided by central IT, and another weak association between the adoption of long-term planning and (again) satisfaction



**Figure 7-14.**  
**Perceived**  
**Researcher**  
**Satisfaction with**  
**IT Infrastructure**  
**and Services**

with the support services provided by central IT. But beyond that, no clear factors associate with researcher satisfaction: not Carnegie classification, not institutional mission, not institutional reputation, not overall organizational climate, not the level of research contracts and grants, not the existence of researcher advisory groups, not the size of the research IT staff, and not the research IT budget. Of course, satisfaction is elusive; as research possibilities and opportunities arise, today’s infrastructure and services are likely to be inadequate for the needs and expectations of tomorrow’s researchers.

### Conclusion

Given their existing resources, central IT organizations will be hard-pressed to meet the increasing demands for infrastructure and services in the changing research landscape. They have relatively small numbers of staff focused exclusively on research, spending dedicated to research support is low, and significant constraints (mostly financial) curb further investment. There is, however, a parallel universe of local IT resources that researchers can turn to, and it is to this domain that we now turn our attention.