

## 4

# The Academic Analytics Landscape

*Information is the oxygen of the modern age. It seeps through the walls topped by barbed wire, it wafts across the electrified borders.*

—Ronald Reagan

As discussed in Chapter 2, the term *academic analytics* is intentionally broad. It encompasses a range of different technology platforms and functional applications. In fact, institutions have employed multiple strategies to enhance their analytical capabilities. Some distribute capacity broadly but use it for very narrow purposes. Others pursue deep use of analytics in a relatively narrow set of areas. The strategy an institution ultimately pursues is attributable to many factors, including resources, institutional control (public or private), and size.

This chapter explores the current landscape for academic analytics in higher education. We examine higher education's overall capabilities today and how they are expected to change in the future. In addition, we examine those institutions with very limited capability today. We identify the barriers that have slowed adoption of academic analytics and examine respondents' plans for the future. This chapter provides an overview that is complemented by deeper analysis in the two succeeding chapters. Chapter 5 looks in more detail at the technologies in use to support academic analytics. Chapter 6 examines the use of academic analytics.

## Key Findings

- ◆ The length of time since the initial implementation of academic analytics is not related to the respondent's reported level of capability.
- ◆ The majority of respondents rely primarily on their transaction systems for reporting and analysis.
- ◆ Fewer than a third of respondents (30.5 percent) have one or more data marts, and 14.3 percent have an enterprise data warehouse.
- ◆ Data marts and warehouses are more prevalent among larger institutions with greater organizational complexity.
- ◆ The most significant barrier to institutions' upgrading their analytical capacity has been the lack of resources and competing IT priorities.
- ◆ Regardless of their present capability, the majority of respondents plan to upgrade their analytical capabilities in the next two years.
- ◆ Among institutions without advanced capability, associate's institutions have the strongest plans to upgrade.
- ◆ Most institutions report that their funding is aligned with their plans to expand their academic analytical capacity.

## Analytical Capacity

Most respondents rely exclusively on their transaction systems' reporting capacity to meet their needs for reporting and analysis. Fewer than one-third (30.3 percent) have a single or multiple data marts, and 14.6 percent have deployed an enterprise-wide data warehouse. Figure 4-1 presents the distribution of respondents' analytical capability by technology platform.

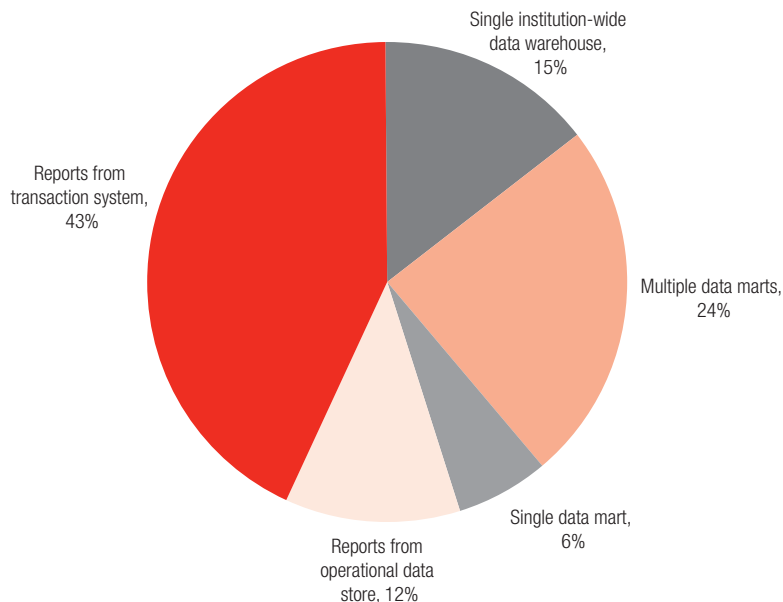
We acknowledge that many institutions actually employ a variety of technologies to provide their analytical capacity. In large institutions, it would not be surprising to find transaction system reporting, a data mart, and a data warehouse all in use. Therefore, we do not see these categories of capability as exclusive. Rather, they could be viewed as stages of capacity wherein later stages include earlier ones. This is not to suggest that more is necessarily better or that all institutions should aspire to a data warehouse. That is the essence of what this research is attempting to understand. We discuss the concept of levels of development of analytical capacity in greater detail in Chapter 5.

The analytical capacity an institution has deployed appears to correlate with both institutional control and size. As Table 4-1 illustrates, a greater proportion of public institutions employ data warehouses or multiple data marts than do private institutions. Conversely, a greater proportion of respondents from private institutions rely on just their transaction system to support all reporting and analysis needs.

It is possible that more public institutions have been driven to create more extensive analytical capacity by their additional regulatory and oversight responsibilities. It is more likely, however, that institutional control is a proxy for another characteristic: size.

When we look at analytical capacity by enrollment size, we see that larger institutions are more likely to have deployed multiple data marts or an enterprise data warehouse. Since more of the respondents with larger enrollments were public, it stands to reason that institutional control and enrollment would tend to behave the same way. In fact, half of the institutions with enrollments over 25,000 students and 31.3

**Figure 4-1.**  
**Analytical**  
**Capacity**  
**(N = 376)**



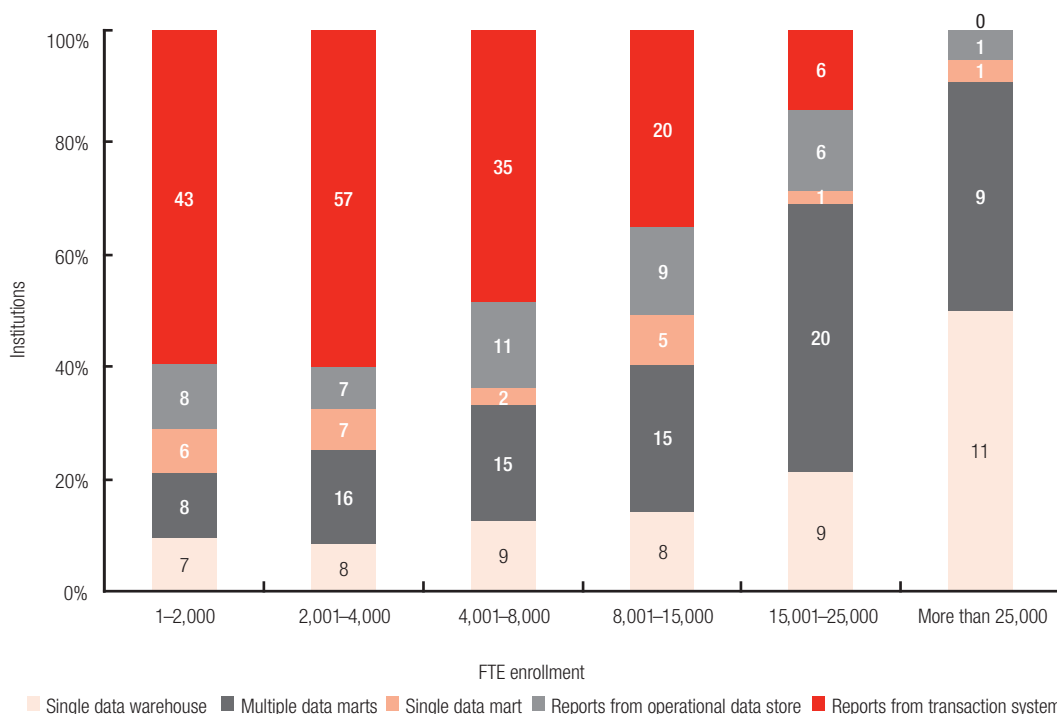
percent of those with enrollments greater than 15,000 students have implemented an enterprise-wide data warehouse. As Figure 4-2 illustrates, the converse is also true. A greater percentage of smaller institutions, which tend to be private, rely on their trans-

action systems for reporting. Relatively few have an institution-wide warehouse.

Again, the potential reasons for a correlation between enrollment size and extent of analytical capacity vary. Larger institutions are inherently more complex to manage. They

**Table 4-1. Respondents' Analytical Capacity (N = 367)**

Platform		Institutional Control	
		Private	Public
Single data warehouse	Count	15	40
	Percentage	9.4%	19.2%
Multiple data marts	Count	29	57
	Percentage	18.2%	27.4%
Single data mart	Count	10	12
	Percentage	6.3%	5.8%
Reports from operational data store	Count	16	28
	Percentage	10.1%	13.5%
Reports from transaction system	Count	89	71
	Percentage	56.0%	34.1%



**Figure 4-2. Analytical Capacity, by Enrollment (N = 360, Numbers in the bars are the number of respondents)**

have a wide variety of programs, student markets, and organizational units to operate. As a result, they may have a greater need to deploy broad institutional capacity for reporting and analysis. Similarly, with the exception of some community colleges, respondents with large enrollments also tend to have multiple collegiate units. This suggests that greater organizational complexity drives the need for enterprise-wide capacity for reporting and analysis in the form of multiple data marts or a data warehouse.

To further understand the factors that potentially explain respondents' differing analytical platforms, we examined whether Carnegie class plays a factor. In fact, there does appear to be a strong association between a respondent's Carnegie class and the analytical capacity they have deployed. More than half (59.4 percent) of the DR institutions surveyed have deployed a data warehouse or multiple data marts. Comparatively, the proportion of master's, bachelor's, and associate's institutions using a warehouse or multiple data marts ranges between 26 and 28 percent. Conversely, the proportion of respondents in each of these Carnegie classes relying just on their transaction systems for reporting ranges between 53 percent (MA) and 60 percent (AA).

So larger, more complex institutions seem to have implemented data marts or warehouses in greater numbers. The following chapter looks more deeply at other factors that may explain why institutions use different technology platforms to support academic analytics.

## Investment Drivers

We asked respondents to indicate the primary reasons that drove them to implement their current analytical capability. We presented a list of potential factors and asked them to pick the three most relevant to their institution. Not surprisingly, the factor most frequently identified was to meet decision makers' increased need for information and analysis. This was selected by nearly 90 percent of respondents who have implemented technologies in addition to their transaction systems to support academic analytics.

As Table 4-2 indicates, we found both similarities and differences in the factors that drive public and private institutions to invest in academic analytics. The state of the respondent's ERP system played a significant role for both institution types. Thirty percent of private institutions and nearly 40 percent of public institutions indicated that their imple-

**Table 4-2. Factors That Led to Implementation of Academic Analytics**

Factor	Private	Public
Provide information to decision makers	90.0%	85.4%
Meet regulatory reporting needs	18.6%	35.8%
Meet board reporting needs	18.6%	19.0%
Provide information to accrediting bodies	15.7%	13.1%
Respond to increased external competition	14.3%	6.6%
Demonstrate outcomes	21.4%	27.0%
Implement along with ERP	30.0%	39.4%
Extend life of legacy system	20.0%	15.3%
Ease transition to ERP	10.0%	16.1%

mentation of advanced analytical capability was tied to the implementation of a new ERP system. For these respondents, the ERP implementation may have provided a singular opportunity to obtain funding to upgrade administrative information systems.

For others, the implementation of a new ERP system may have been an acknowledged precursor to enable advanced academic analytics. Jerome Waldren, CIO at Salisbury University, explains how his institution viewed the relationship between ERP and academic analytics. "There are three years to an implementation. The first is the shock year: you roll it out and everyone realizes that it is different from the old system. In year 2, users start to modify their business practices and figure out how to do business efficiently. Year 3 is the icing on the cake. You can start to introduce advanced applications like business intelligence [academic analytics]."

Some public and private institutions invested in their analysis and reporting capabilities as a strategy to forestall the need to implement an ERP solution. In fact, 20 percent of private institutions and 15.3 percent of public institutions cited the need to extend the life of their legacy transaction systems as a top driver for their investment in advanced analytical capacity. Some public institutions (16.1 percent) also saw their investment in academic analytics as a way to ease the transition to ERP. Among private institutions, 10.0 percent cited this as a top reason.

Where public and private institutions differ is on the importance of regulatory reporting as a driver. Among public institutions, 35.8 percent indicated that meeting regulatory reporting requirements was a top-three driver. Only 18.6 percent of private institutions saw this as a top driver. In some cases, state institutions need to provide more information as a quid pro quo for more autonomy. This is the case for the College of William and Mary in Virginia. Associate Provost Courtney Carpenter explains, "We are transitioning to a new relationship

with the state that gives us more autonomy. In exchange, the state requires greater evidence that we are producing student outcomes."

Susan Grotevant, director of information management systems at the University of Minnesota, explains that decreased state funding has spurred the need for academic analytics. "Over the last five years, the university has seen significant cuts in funding from the state. As a result, tuition and research funding have become significantly more important. As money has become tighter and more competitive, interest in information and analysis has grown."

Comparatively, a similar percentage of private institutions (18.6 percent) and public institutions (19.0 percent) identified board reporting as a top driver. The difference in perspective appears to stem from public institutions' need to report to system offices and state government as well as their boards.

While regulatory reporting may currently impact public institutions more than private, the future may hold increased public accountability for both. Reagan Ramsower, CIO and acting vice president for finance and administration at Baylor University, sees the future this way: "Higher education is going to face more accountability, especially the public institution. If institutions continue to increase tuition at rates larger than GDP growth or inflation, the public outcry will become immense. We need to be prepared to operate with fewer resources."

Finally, both public and private institutions saw accrediting bodies and the need to generate outcomes as similar drivers. A comparable percentage of private institutions (15.7 percent) and public institutions (13.1 percent) saw accrediting bodies as a top reason for their investment in academic analytics. Similarly, respondents from both public and private institutions ranked the need to demonstrate outcomes as a top reason. It was selected third most frequently by private institutions as a top factor. Among public institutions, it was the fourth most frequently selected driver.

## Timing of Initial Implementation

The elapsed time since respondents began to first implement advanced analytical capability appears to have no relationship with the actual capacity they chose to create. We asked respondents to report how long ago they implemented their first data warehouse, data mart, or other type of advanced analytical capacity. As Figure 4-3 illustrates, the majority of respondents began to implement their analytical capacity in the past five years. Approximately 20 percent (20.8 percent) implemented between six and eight years ago, and another 23.7 percent first implemented a data store of some type nine or more years ago.

A respondent that began implementation more than five years ago is as likely to have an enterprise data warehouse as an institution that just began implementing in the last two years. Again, other factors appear to take precedence in driving institutions' decisions regarding the capacity they create.

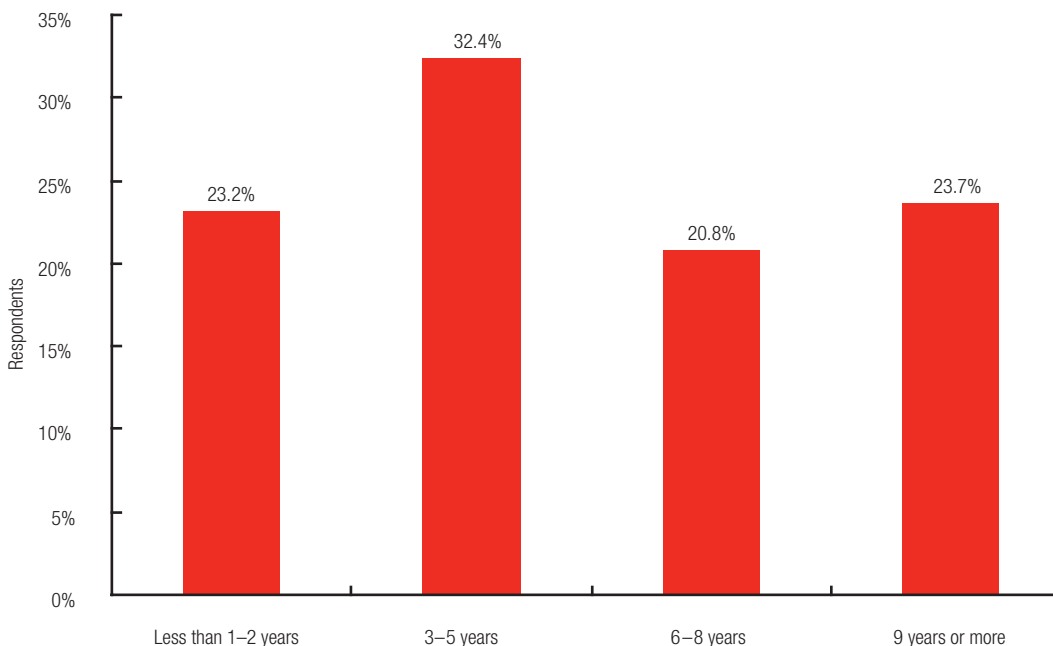
Institutions with analytical capability beyond transaction system reporting also varied in the relative order in which they implemented their

systems infrastructure. As Table 4-3 illustrates, more than a third (38.2 percent) implemented their analytical capabilities either before or concurrent with their ERP implementation. Nearly another third of respondents (28.3 percent) implemented after they had completed their ERP systems. Interestingly, 15.1 percent of respondents have not yet implemented an ERP system. This group appears to have followed a strategy of developing their analytical capability in tandem with their legacy transaction processing systems.

## Expansion Plans

We asked respondents about their future plans as well. Among respondents with analytical capability beyond their transaction systems, 62.9 percent reported that they would significantly upgrade their capabilities in the next two years. The plans to upgrade capacity were strong among both public and private institutions. Among public institutions, 69.3 percent agreed or strongly agreed that they would make significant upgrades in the next two years. Among private institutions, 50 percent agreed that they would upgrade.

**Figure 4-3.**  
Elapsed Time  
Since First  
Implementation  
of Data Ware-  
house, Mart, or  
Store (N = 376)



Examining upgrade plans by Carnegie classification, we see that system offices (multi-campus public institutions) answered most affirmatively that they would upgrade their capacity (Table 4-4). We asked respondents to use a five-point scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) to indicate their agreement with the statement that they would upgrade their analytical capability significantly in the next two years. The mean responses from all Carnegie classes exceeded 3.00, with the lowest mean being that of BA institutions (3.23). Given the relatively high means and relatively low variance, it is evident that there is a strong commitment to upgrade

among system offices and associate's and doctoral institutions. The mean response from MA and BA institutions was closer to neutral, and the variance was higher. This suggests that among these respondents there were equivalent numbers of institutions that somewhat agreed and somewhat disagreed with the statement, indicating less uniformity in their commitment to upgrade. The relatively higher mean response from doctoral institutions, system offices, and associate's institutions may suggest that more-complex organizations (multicollegiate) or institutions with larger enrollments (such as community colleges) have more pressing needs to upgrade their capacity.

**Table 4-3. Implementation Timing of ERP and Advanced Analytical Capability (N = 212)**

Timing	Number of Institutions	Percentage of Institutions
Before ERP	31	14.6%
Concurrent with ERP	50	23.6%
After ERP	60	28.3%
Before and after ERP	35	16.5%
No ERP	32	15.1%
Only ERP	4	1.9%
<b>Total</b>	<b>212</b>	<b>100.0%</b>

**Table 4-4. Upgrade Plans, by Carnegie Class (N = 213)**

Carnegie Class	Mean	N	Std. Deviation
System	4.33	15	0.724
Other	4.33	3	1.155
AA	4.00	19	1.054
Specialized	4.00	8	0.756
DR	3.84	74	0.980
Canada	3.57	14	1.089
MA	3.38	50	1.210
BA	3.23	30	1.040
<b>Average/Total</b>	<b>3.69</b>	<b>213</b>	<b>1.076</b>

*Q: My institution plans to significantly upgrade its reporting, modeling, analysis, and decision support capability in the next two years. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)*

### Funding for Expansion Plans

Respondents appear to have aligned their funding plans with their upgrade strategies. Table 4-5 compares respondents' intent to upgrade capacity with their degree of confidence that they would also increase funding for academic analytics. The first question of the table indicates how respondents view their institutions' plan to invest in academic analytics. The second question shows respondents' mean level of agreement with the statement that their institutions plan to significantly upgrade their analytical capacity. As one would hope, there is a strong relationship between respondents' plans to upgrade capacity and their intention to spend more money on academic analytics in the next two years. Respondents who agree or strongly agree that their institutions will make significant upgrades also agree or strongly agree that their institutions will spend more money. Conversely, those institutions that did not think their funding would increase also did not plan to upgrade their capacity.

### Why Institutions Employ Limited Analytical Capacity

We were very interested in understanding why some respondents elected not to implement any advanced analytical capabilities. As noted, many institutions rely on their transaction processing systems for information and analysis. Is it because they lack the complexity to require additional capacity? Or do they view the technology as immature or difficult to implement? Or, is it simply a matter of time resources?

We asked respondents who rely only on their transaction systems for reporting and analysis to tell us whether they plan to expand and what prevents them from doing so. Timing appears to be a very important factor. Nearly half (49.1 percent) of respondents with transaction reporting capacity today said they are planning to expand their capacity in the future. Jerome Waldren explains how his institution is using transaction system reporting as a short-term solution. "We were not ready

**Table 4-5. Upgrade Plans Compared to Spending Plans (N = 210)**

		Upgrade analytical capacity		
		N	Mean	Std. Deviation
<b>Allocate more money</b>	Strongly disagree	11	2.27	1.009
	Disagree	58	3.09	1.014
	Neutral	73	3.63	0.921
	Agree	56	4.45	0.570
	Strongly agree	12	4.92	0.289
	<b>Average/Total</b>	<b>210</b>	<b>3.70</b>	<b>0.821</b>

*Q: My institution will allocate significantly more money for reporting, modeling, analysis, and decision support solutions for the next two years. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)*

*Q: My institution plans to significantly upgrade its reporting, modeling, analysis, and decision support capability in the next two years. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)*

to create a warehouse. In the short term, we developed our own flat files and used our own tools against them. We built them for student areas (such as admissions), so we could use tools like SPSS to develop some reports.”

For those who have not yet expanded their capacity, the issue appears to be resources. The two most significant reasons respondents gave for not having implemented more advanced capacity were the prevalence of other IT priorities (42.3 percent) or the lack of sufficient funding (27.6 percent). Both are indicators of constrained resources.

The next most significant barriers relate to institutional culture. In fact, 17.2 percent of respondents who have not upgraded their capacity cited lack of support from data owners as a significant barrier. In addition, 11.7 percent cited cultural resistance among their primary reasons for not expanding capacity. Interestingly, only 7.4 percent said that it was too difficult technically to expand their analytical capacity. Respondents did not appear to view data warehouses or data marts as new or unproven technology. Lastly, only 9.2 percent have not expanded their analytical capacity because they do not require additional capacity.

### Most Rate Current Capabilities as Insufficient

The majority of respondents acknowledge the need to expand their institution’s

capacity to perform academic analytics. The primary driver to expand capacity is to meet expanding user needs. More than half of respondents (53.8 percent) report that their current capabilities are not sufficient to meet user needs. In fact, we asked respondents to agree or disagree with the statement “Our current reporting and analysis capability meets user requirements.” As Table 4-6 illustrates, we found some variance in satisfaction with analytical capacity on the basis of institutional type. However, respondents across all Carnegie classes report dissatisfaction with their present capabilities. DR institutions reported the largest gap between user needs and current capability, followed by MA and AA institutions. Although BA institutions appear somewhat more satisfied, their mean responses were only slightly greater than neutral to the statement “Current capacity meets user needs.” The greatest variance in response came from AA institutions, indicating that some agreed and some disagreed that present capability met needs.

So, the majority of those institutions that reported limited analytical capacity today (that is, they report only from their transaction systems) plan an expansion in the next two years. In fact, only 11.5 percent of respondents with limited capacity today plan to continue the status quo. Interestingly, the strongest commitment to expand the capacity to perform academic analytics is among

**Table 4-6. Current Capacity Meets User Needs, by Carnegie (N = 145)**

Carnegie Class	Mean	N	Std. Deviation
BA	3.05	41	1.024
AA	2.69	29	1.168
MA	2.43	58	0.920
DR	2.12	17	0.858
<b>Average/Total</b>	<b>2.62</b>	<b>145</b>	<b>1.035</b>

Q: Our current reporting and analysis capability meets user requirements. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

AA institutions. We asked respondents to agree or disagree with the statement “My institution plans to significantly upgrade its academic analytical capability in the next two years.” As Table 4-7 illustrates, AA institutions agreed the most that they would expand their capacity. Doctoral institutions, which report having the least satisfaction with current capability (among those with only transaction system reporting capacity), had the second highest mean agreement. However, the small number of responses prevents us from concluding that these are statistically significant relationships.

### Drivers to Expand Capacity

Better information to support decision making and increasingly complex external reporting requirements are driving the need to expand analytical capacity. In this regard, respondents with limited capacity were much like those who have already invested in data marts or warehouses. We asked the respondents with only transaction system reporting capacity today to tell us what factors would drive their need to build additional capacity. The top three drivers selected were the need for information to support decision making (37.9 percent), regulatory reporting requirements (16.9 percent), and increased pressure to demonstrate outcomes (16.1 percent). In addition, 15.1 percent identified

the need to provide information to accrediting bodies as a top-three driver.

We also asked respondents to tell us which areas would benefit most if they expanded their analytical capabilities beyond transaction system reporting. Respondents most frequently identified institutional research (29.2 percent), enrollment management (25.8 percent), and central business/finance (22.8 percent) as the most likely beneficiaries of additional capacity. The areas least likely to benefit from expanded capacity are human resources, research administration, and fundraising. These expectations mirror the actual experience reported by respondents who have already deployed advanced analytical capacity (see Chapter 6).

### Funding

Finally, institutions appear to be allocating resources to enable the expansion of their academic analytics capability. We asked institutions to agree or disagree with the statement that their institution will allocate significantly more money to support academic analytics over the next two years. Institutions believing strongly that they will expand their capacity in the next two years also report that their institutions will allocate significantly more money to academic analytics (see Table 4-8).

So, most respondents appear to have aligned their funding strategies with their

**Table 4-7. Upgrade Plans for Institutions Without Advanced Capability, by Carnegie Class (N = 145)**

Carnegie Class	Mean	N	Std. Deviation
AA	4.28	29	1.162
DR	3.88	17	0.993
MA	3.84	58	1.105
BA	3.66	41	1.132
<b>Average/Total</b>	<b>3.88</b>	<b>145</b>	<b>1.121</b>

*Q: My institution plans to significantly upgrade its reporting, modeling, analysis, and decision support capability in the next two years. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)*

**Table 4-8. Upgrade Plans for Institutions Without Advanced Capabilities, by Funding Plan (N = 163)**

		Upgrade analytical capacity		
		N	Mean	Std. Deviation
<b>Allocate more money</b>	Strongly disagree	16	2.50	1.414
	Disagree	44	3.36	1.014
	Neutral	47	3.98	0.847
	Agree	35	4.29	0.710
	Strongly agree	21	5.00	0.000
	<b>Average/Total</b>	<b>163</b>	<b>3.87</b>	<b>1.108</b>

**Q:** My institution will allocate significantly more money for reporting, modeling, analysis, and decision support solutions for the next two years. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

**Q:** My institution plans to significantly upgrade its reporting, modeling, analysis, and decision support capability in the next two years. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

plans to expand their analytical capability. However, the recent past offers up some degree of caution. We asked this same group of respondents to agree or disagree with the statement that their institution currently provides enough funding to keep pace with user needs for academic analytics. Responses were based on the same five-point scale used previously. The mean response was 2.32 and the variance was 1.004. This suggests that most respondents were already facing shortfalls in funding to meet today's needs. So any additional funding to support expanding capacity will need to be relatively significant.

## Summary

Academic analytics appears to be going through a transition. Today, reporting from transaction systems is the most prevalent source of information and analysis. Advanced

analytical platforms (such as data marts or data warehouses) are more prevalent among large, complex institutions such as research universities and those with large student enrollments. However, the expected pressures from external and internal demands for information have led most institutions to plan significant expansion of their analytical capabilities. Plans for expansion span institutional types as well as present capability levels.

It appears we are entering an era in which institutions will spend more time and resources to build their capacity to distribute and analyze information. For many, this appears to be a natural progression from their investment in new ERP capabilities. Those investments have provided them with the ability to capture information. The next wave of investment is aimed at improving the ability to extract, distribute, and manipulate that information.