A Common Currency

Achieving Excellence in Data Governance and Adoption of Analytics

IT Forum

IT Forum

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A Common Currency Toolkit

Visit the online toolkit to download resources to assist with implementation of tactics. Example resources include job descriptions, organizational charts, role-based data access privilege models, and a business intelligence readiness assessment.

To learn more, visit:
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Founded in 1979 to serve hospitals and health systems, The Advisory Board Company is one of the nation's largest research and consulting firms serving nonprofit, mission-driven organizations. With a staff of over 2,300 employees worldwide, including 1,150 in Washington, D.C., we serve executives at about 3,000 member organizations in more than two dozen countries, publishing 150 major studies every year on progressive management practices.

Our Work in Higher Education: The Education Advisory Board

Encouraged by leaders of academic medical centers that our model and experience serving nonprofit institutions might prove valuable to colleges and universities, The Advisory Board Company launched The Education Advisory Board, our higher education practice, in 2007. We are honored to serve over 800 college and university executives through our EAB memberships.

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Strategic advice for provosts to elevate performance in teaching, research, and academic governance

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Student support tool for college navigation and career pathing to help colleges improve graduation and employment outcomes

Advisors to Our Work

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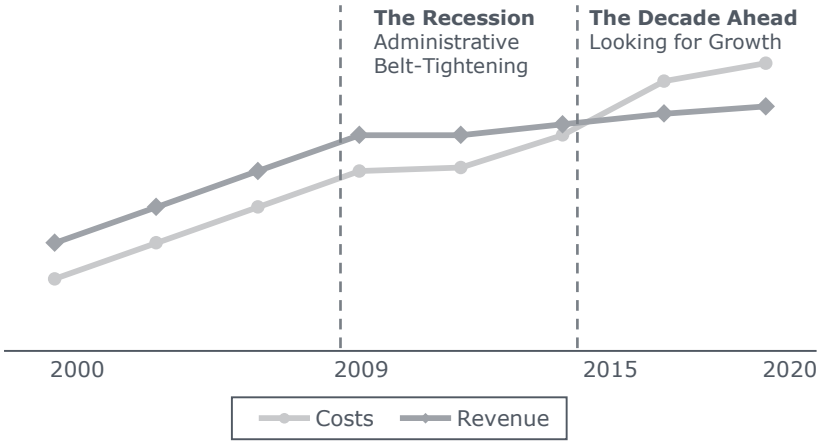
Executive Summary

Intuition-Driven Decision Making No Longer Sufficient

Increases in higher education costs and greater competition for students, donations, research grants, and other revenue sources have necessitated data-informed decision making at many institutions. Pressure to be more analytical comes from many places, from state legislatures to boards of trustees, and often winds up at the CIO's door because business intelligence is perceived by campus members to be a technical capability.

Flattening Revenues, Rising Costs



Data Governance Is Crucial to BI Success, but Often Low in Maturity

Data governance, the process of creating standards for data elements (e.g., data definitions, potential values, security levels), promotes consistency that enables reliable data comparison across an organization—a fundamental input to BI. Many organizations, however, suffer from low accountability for data governance responsibilities and poor campus engagement in related discussions. Institutions with successful data governance efforts have created sustainable models for ongoing data governance efforts, achieved consistently defined performance metrics across the institution, and created more mature BI efforts.

Enterprise Data Governance Indicative of Mature BI

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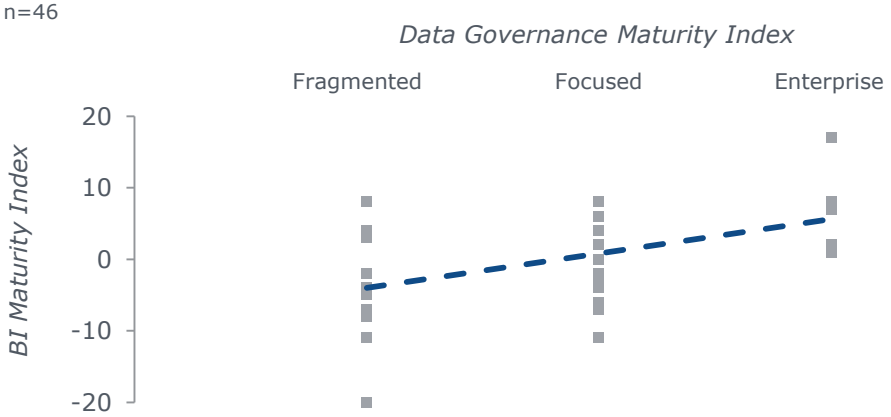
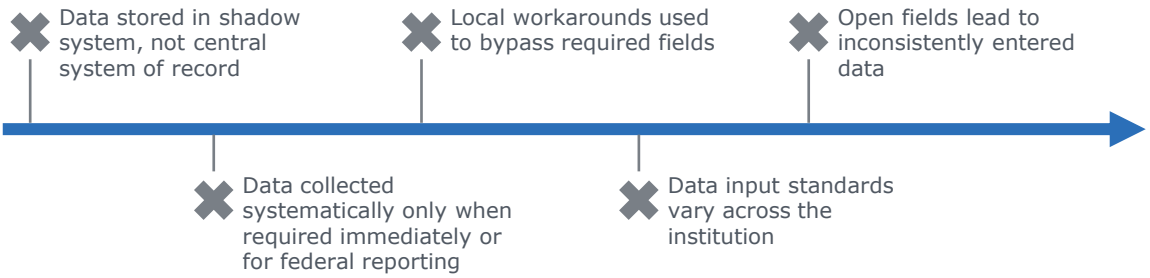


Source: EAB IT Forum 2014 BI Survey; EAB interviews and analysis.

Data Quality Everyone's Problem, No One's Job

Higher education institutions collect large amounts of data, such as student grades, swipe card records, faculty service activity, and procurement purchases, but much of the data is too low quality to be useful in data analysis. Poor quality data may impede analyses or guide campus members to misinformed conclusions. Few campus members are incented to fix data problems (e.g., missing data, incorrect data, misplaced data) in source systems, so data cleaning occurs only (if at all) in frozen sets outside source systems. Institutions that have increased data quality in source systems have achieved gains in BI staff productivity and campus member efficiency.

One Valid and Accurate Value, Many Chances for Mistakes



Role-Based Access Holds the Solution for Secure, Just-in-Time Data Privileges

Users must have access to data for analysis, but typical case-by-case access provision practices fail to balance access, efficiency, and privacy. Institutions, trying to balance security with openness, typically create processes in which individuals request access on a case-by-case basis. However, desire for data (and more objective security) has outpaced the adequacy of one-off access requests. Institutions have turned to models of role-based security to provide quicker and more principled data access to categories of campus members.

Case-by-Case Access Determinations Not Making the Cut

Data Access the New Password Reset

- One FTE may be dedicated to access privilege granting, in an already overworked and understaffed environment

Not Quite Just-in-Time Data Access

- Time to provision at a typical university: 2-4 weeks
- Loss of productivity while waiting for data access: priceless

Lack of Standards = Lack of Security

- Subjective and inconsistent privilege granting across data stewards

Source: EAB interviews and analysis.

Campus Members Need Help Identifying What Data Is Relevant and Useful

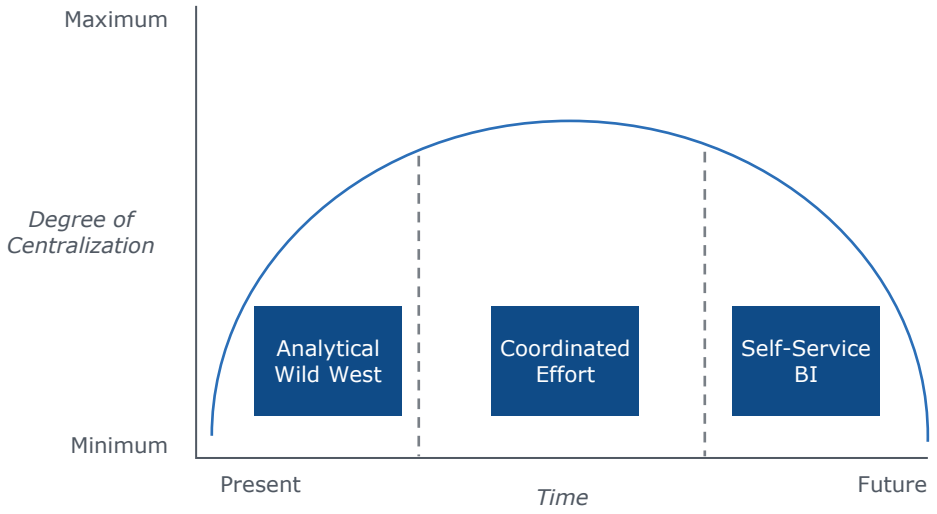
The jump from intuition-based decision making to data-informed decision making has outstripped many campus members' ability to use data to inform decisions. These campus members struggle to identify data sets and reports that may help them make better decisions; their frustrations often lead to low adoption of analytical resources and central data sets. Institutions that have been successful in increasing BI adoption have focused on making reports more relevant to end users through methods such as data spotlights, recommended report functions, and report enhancement mechanisms.

Struggling to Find the Value in Data

BI Efforts Require Enterprise Support and Dedicated Leadership to Manage Change

Many existing analytical initiatives across campus occur without coordination, causing duplicative work, redundant spend, and untapped institutional expertise. Coordination of analytical efforts may require a strong central effort to achieve institutional standardization and a "single source of truth" data set. Progressive institutions have also merged institutional research and BI units into one analytics team, and some institutions have begun to staff up data management and analytical efforts by hiring directors of data governance or chief data officers.

Organizational Evolution of Analytical Efforts



Source: EAB interviews and analysis.

Understanding Your Current Practice

The following questions are designed to guide members in evaluating their current activities. Members may use them to determine if the full range of best practices is being used on their campuses and to evaluate whether absences represent an opportunity for investment or action.

Data Governance for Performance Management *Achieving Sustainability and Enterprise KPI Selection*	**Yes**	**No**
Do your campus members agree with the statement that data is owned by the institution, not by individuals or departments?		
Does your campus leadership manage performance through consistently defined metrics?		
Does your data governance effort involve visible senior leadership support? Does a separate group of subject matter experts focus on operational aspects of data governance (e.g., data definitions, campus member responsibilities)?		
Are data governance committee members engaged in each meeting they attend?		
Do your data governance efforts rightsize participation in definition creation?		
Is your institutional data dictionary publicly accessible, easy to find, understandable to nontechnical staff, and comprehensive in detail? Is metadata accessible through the BI platform?		

If you are interested in practices to help increase maturity in these areas, turn to pages 27–50.

Data Quality Tolerance *Accountability and Workflow*	**Yes**	**No**
Are data stewardship responsibilities formalized in job responsibilities and staff evaluations?		
Does your institution have an automated way to identify data errors? Are the results of error checks then communicated to campus members to fix data errors in source systems?		
Is data quality performance tracked and managed at the unit level?		
Once error-prone data fields are identified, do campus members receive standard instructions to help improve data entry practices?		

If you are interested in practices to help increase maturity in these areas, turn to pages 51–76.

Hardwiring Data Access Provision *Data Segmentation and Role-Based Access*	**Yes**	**No**
Does your institution have a standardized method for segmenting confidential data from public data?		
Do campus members obtain access to data based on their campus roles rather than based on individual requests?		

If you are interested in practices to help increase maturity in these areas, turn to pages 77–96.

Maximizing Report Relevance *Increasing Awareness, Perceived Value, and User Capability*	**Yes**	**No**
Can campus members identify the value of data within reports easily?		
Are there ways for the BI platform to make users aware of other reports that may be of interest to the users?		
Do campus members struggle to identify what questions to ask of data in reports?		
Does the BI team make report enhancement and retirement decisions based on evidence of adoption and frequency of use?		
Is the BI team's work (e.g., data integration, dashboard delivery) prioritized by combined inputs from technical staff and subject matter experts?		
Is there a channel for user feedback to inform report enhancement or creation?		
Does the BI team engage with users to identify technical obstacles that prevent campus members from getting value out of reports?		

If you are interested in practices to help increase maturity in these areas, turn to pages 97–134.

Organizational Continuity *Dedicated Organization and Leadership*	**Yes**	**No**
Has your campus created a central group to oversee BI?		
Do IR and BI units share a common vision for data?		
Does your institution dedicate a full-time individual to oversee data governance and data management?		

If you are interested in practices to help increase maturity in these areas, turn to pages 135–150.

20 HALLMARKS of the Data-Driven University

Data Governance for Performance Management

Culture

- Institutional Ownership of Data

Governance

- Bicameral Data Governance Committees
- Fast-Cycle Decision Frameworks
- Pop-Up Data Dictionaries

Data Quality Tolerance

Centrally-Driven Oversight

- Accountable Data Stewards
- Unit-Level Data Quality Scorecards

Distributed Accountability

- Automated Data Quality Testing
- Fast-Turnaround Error Check Reports
- User-Friendly Data Entry Instructions

Hardwiring Data Access Provision

Data Management

- Data Sensitivity Classification Framework

Access Management

- HRIS Access Rights Coding
- Role-Based Data Access Rights

Consistently-Defined Performance Metrics

Units Held Accountable for Quality Levels

Automated, Principled Permissions Granted at Scale

EAB

Maximizing Report Relevance

Organizational Continuity

Marketing

- BI Merchandising
- Personalized Recommendation Engine

Incorporating User Feedback

- Demand-Driven Report Enhancement
- Unit-Level BI Road Maps
- Crowdsourced Innovation
- Low-Cost Bridge Workarounds

Collective Action

- Centralized BI Group

Accountability

- Chief Data Steward

BI-User Dialogue Improving Self-Service Analytics Capabilities

Analytics Embedded Into Campus Members' Everyday Workflows

Analytics as an Enterprise Process

INTRODUCTION

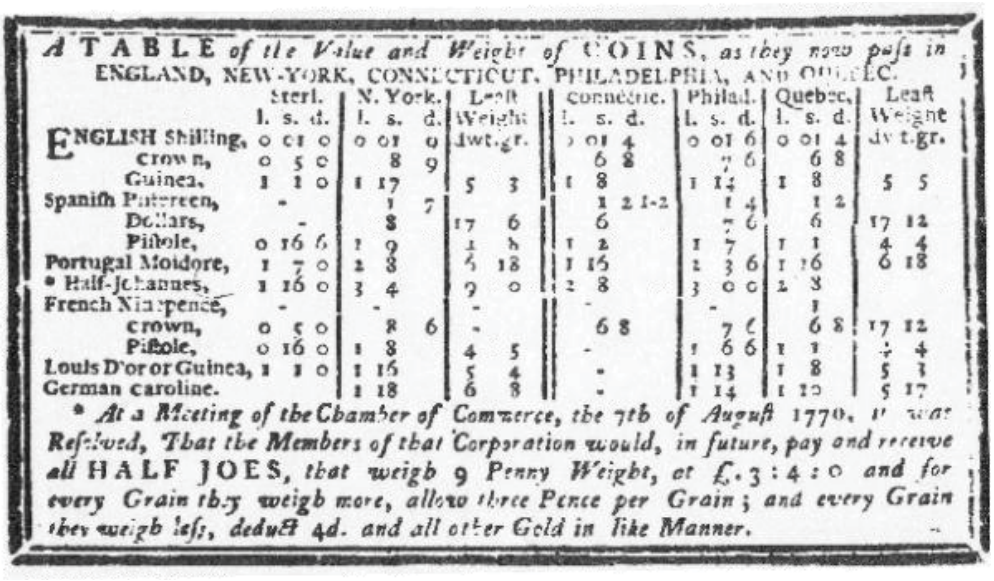
Let's Start with a Story

When the United State of America was in its infancy, its leaders saw a need for a common currency—an agreed upon standard for trade. Lack of a common currency had resulted in confusion, inefficiency, and a lack of confidence in the fledgling nation's financial system. Happily, these problems were eradicated by the U.S. economy's transition to a standard unit—the dollar—at the end of the 18th century and the beginning of the 19th century.

There are many parallels within this story to the present-day need for standardization in decision support. In modern organizations, data from different sources and with nonstandard definitions cause chaos and can slow down decision making.

Institutions with high business intelligence maturity levels have identified and addressed the same type of need that the U.S.'s founding fathers recognized –that of a shared currency of commonly defined terms and a common source for the values measured. Such institutions know that these elements are crucial to institutional effectiveness and efficiency in decision making.

Standard Data—Decision Support's Common Currency



A TABLE of the Value and Weight of COINS, as they now pass in ENGLAND, NEW-YORK, CONNECTICUT, PHILADELPHIA, AND QUEBEC.

	Sterl. l. s. d.	N. York. l. s. d.	Leaft Weight dwt. gr.	Connecticut. l. s. d.	Philad. l. s. d.	Quebec, l. s. d.	Leaft Weight dwt. gr.
ENGLISH Shilling,	0 01 0	0 01 0		0 01 4	0 01 6	0 01 4	
Crown,	0 5 0	8 9		6 8	7 6	6 8	
Guinea,	1 1 0	1 17	5 3	1 8	1 14	1 8	5 5
Spanish Pistereen,	-	1 7		1 2 1-2	1 4	1 2	
Dollars,	-	8	17 6	6	7 6	6	17 12
Pistole,	0 16 6	1 9	1 h	1 2	1 7	1 1	4 4
Portugal Moidore,	1 7 0	2 8	3 18	1 15	2 3 6	1 16	6 18
* Half-Johannes,	1 16 0	3 4	9 0	2 8	3 0 0	2 8	
French Ninepence,	-	-	-	-	-	1	
crown,	0 5 0	8 6	-	6 8	7 6	6 8	17 12
Pistole,	0 16 0	1 8	4 5	-	1 6 6	1 1	4
Louis D'or or Guinea,	1 1 0	1 16	5 4	-	1 13	1 8	5 3
German caroline.		1 18	6 8	-	1 14	1 12	5 17

* *At a Meeting of the Chamber of Commerce, the 7th of August 1770, it was Reſolved, That the Members of that Corporation would, in future, pay and receive all* HALF JOES, *that weigh 9 Penny Weight, at £.3:4:0 and for every Grain they weigh more, allow three Pence per Grain; and every Grain they weigh leſs, deduct 4d. and all other Gold in like Manner.*

IMAGE CREDIT: NATIONAL BUREAU OF ECONOMIC RESEARCH

Source: Rousseau P, "A Common Currency: Early U.S. Monetary Policy and the Transition to the Dollar," National Bureau of Economic Research (2004); EAB interviews and analysis.

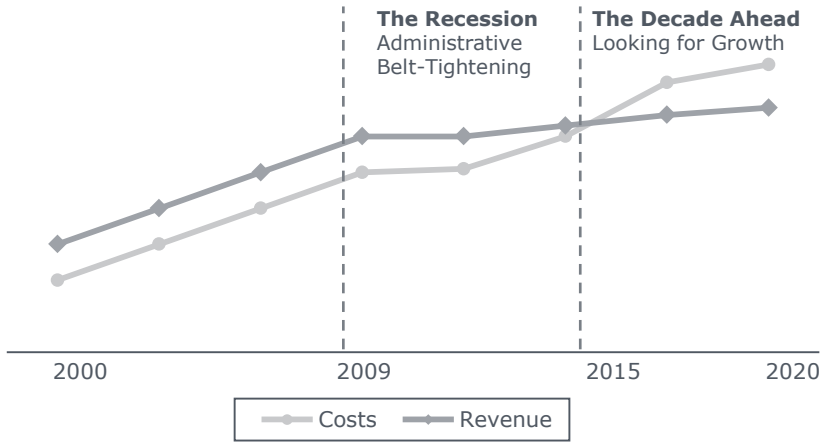
Doing More with the Same (or Fewer) Resources

As increases in higher education institutions' costs have begun to surpass increases in revenues, many leaders are realizing that the status quo of basing decisions on intuition, past precedents, or political pressures is no longer serving colleges' best interests.

Higher education executives are struggling to prioritize internal investments in this constrained financial environment. Previously, campus leaders could permit most investments to move forward; now, they need to make smarter decisions to prioritize new investments on a more limited budget.

How Do We Get Our Universities to Adjust to the New Budget Realities?

Flattening Revenues, Rising Costs



Harder to Fund "Business as Usual" Requests

Education Dean
To stem enrollment decline, wants to launch online master's for mid-career professionals

Provost
Additional funds for institution-wide initiatives

Engineering Dean
Needs adjuncts to cover release time to raise research profile

Urban Studies
Department chair requests faculty lines to launch interdisciplinary program with school of public health

CBO
Challenged to find new dollars for new initiatives

Student Success Task Force
Recommends adding 50+ sections to bottleneck general education courses

The New Reality

"Ten years ago, I could find a way to fund 20 out of 20 new investments across the university. Now, I'm lucky if I can in good conscience green-light five, and our academic leaders have a hard time understanding why."

CBO
Private Master's University

Source: EAB interviews and analysis.

Struggling to Answer Questions from Boards

Pressure to implement data-driven decision making is coming not only from other cabinet members, but also from legislatures and trustees.

The move to performance-based funding has restructured how many institutions are assessed, meaning that institutions have had to redefine "success."

Many trustees come from private industry, where business intelligence is more mature, and more embedded, than in higher education. Trustees bring with them their private sector expectations for BI and want higher education executives to be able to provide them with data to help guide their thinking. However, even when a data request comes from such top leadership, latency is often an issue. Most higher education leaders measure the time to get data in terms of weeks rather than hours or minutes.

Latency and Effort to Marshal Critical Data Undermines Credibility

Hard to Measure Strategic Goal Achievement

"Well Get Back to You in a Month"

"Our President was updating the board on a major goal, recruiting more high-achieving Latinos from across the country. We showed them our new curriculum and marketing material. Someone asked how many students we'd admitted, and what programs they selected. It took us the whole day to be able to say it would take IR a month to get the data.

CIO
Private Research University

Source: EAB interviews and analysis.

Ready, Fire, Aim

Despite widespread desire for decision support data, institutions are struggling to coordinate data-driven efforts across campus.

Almost one-quarter of respondents to the IT Forum's BI Survey reported starting a centralized business intelligence initiative over five years ago, and more than two-thirds reported starting one in 2013 or earlier.

Even with this length of experience, many CIOs and directors of business intelligence lamented that the BI efforts on campus were still uncoordinated, with business unit leaders and deans hiring their own analytics directors. Most universities also lack any type of written BI strategy plan (e.g., a stand-alone plan or one integrated within the IT or institutional plan).

All Corners of the Campus Already Using Data… Differently

EAB 2014 BI Survey

When Did You Start Your Central BI Initiative?

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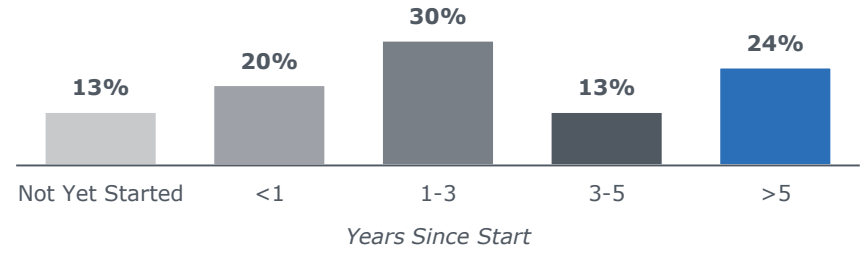
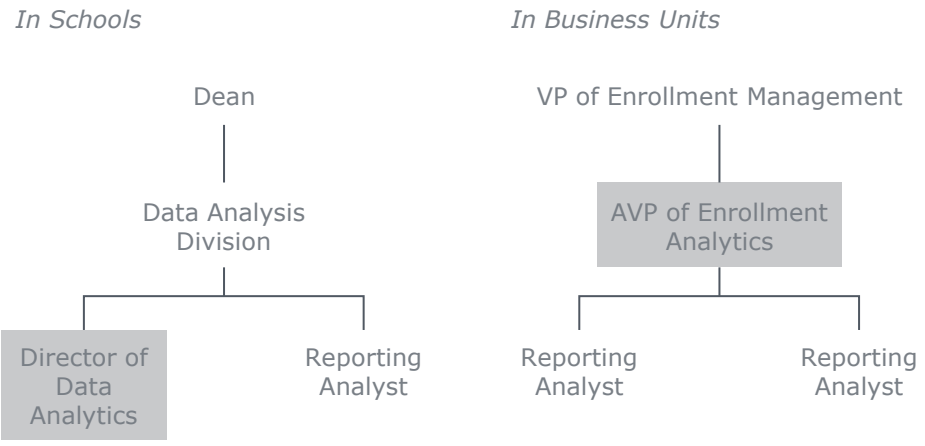


Distributed Analytics Staff Appearing Across Campus



Do You Have a Written BI Strategy Plan?

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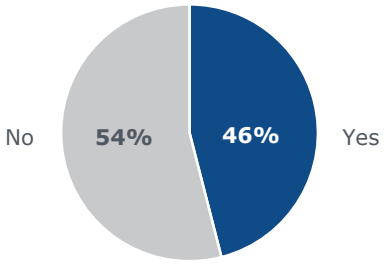


Source: EAB IT Forum 2014 BI Survey; EAB interviews and analysis.

Easier Said Than Done

Institutions implementing business intelligence initiatives face a number of challenges, including inconsistent data definitions, poor data collection, and suboptimal systems architecture.

The traditional intuition-based approach to higher education decision making does not require standard data definitions. Because of this legacy, each department in a university often has its own way of defining terms like "student" or "section fill rate." A lack of visibility into other departments' definitions furthers inconsistency in data definitions across campus.

Institutional data collection activities also suffer from poor data entry processes, with open fields undermining analysis efforts and user convenience trumping proper input for many data entry staff.

Many universities' systems are not aligned to institutional data-gathering needs, and data silos, all too common in decentralized organizations, further hamper data-driven decision making.

Roadblocks to Effective Central Data-Driven Decision Making

Data Definitions

- No standard definitions
- No access to data definitions
- Variations in existing definitions
- No central staff to resolve inconsistencies

Data Collection

- Data fields not collected
- Open field entries not defined
- Place-holder data used
- Fields misappropriated
- No checks on data entry quality

Data Systems

- Static system structure not aligned to the institution
- Improper system implementation
- Existence of suboptimal shadow systems
- No standardized data practices

Limited by Design?

"Higher education has always been involved in data and data analysis. We've had to deal with it in the form of enrollment management, the processing of applications, in the student information system, in the course management system, in transcripts and academic records… But besides being for the most part siloed, this data has been somewhat limited by design—by the specific function for which it was originally intended."

John Ittleson
Senior Fellow and Acting Associate Executive Director of the Online Education Initiative of the California Community Colleges, Chancellor's Office

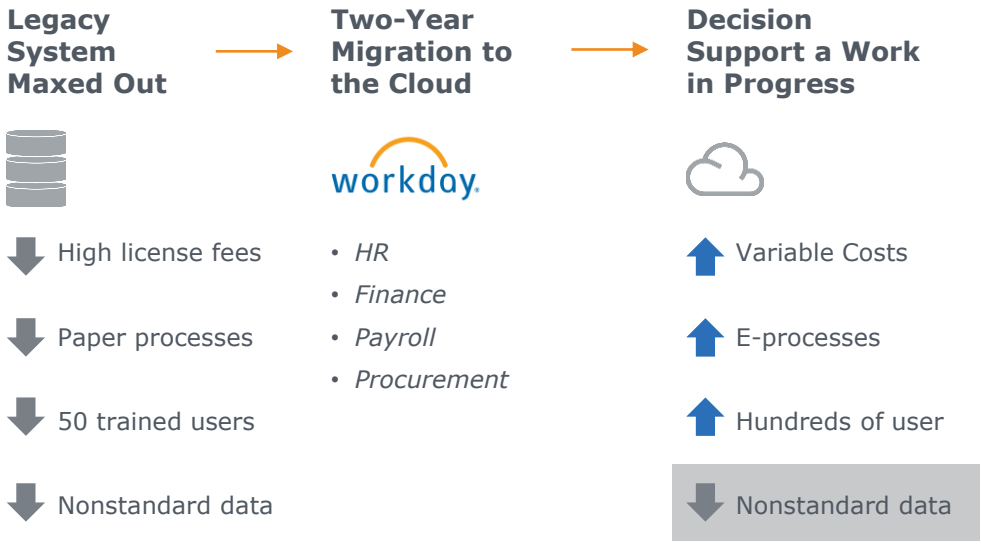
Source: Grush M, "Big Data: An Evolution in Higher Education's Technology Landscape," Campus Technology (2014); EAB interviews and analysis.

Moving to the Cloud Not a Panacea

Some leaders have looked to the cloud as a potential solution to data management problems—a silver bullet for the "garbage in, garbage out" issue of data quality. These shortcut attempts have proven unsuccessful, however, largely because the root of data management problems is not technology but rather organizational issues.

One university chief business officer who was successful in reaching several of her goals with a cloud ERP migration found that the move to the cloud did not resolve institutional data management issues. After the migration, the CBO still could not identify basic information such as how many FTEs worked at the university.

Data Consistency Problems Continue to Frustrate Early Adopters



How Many FTEs Do We Have?

"A trustee asked why we didn't do activity-based costing. I said we'd get to that as soon as we could figure out how many people work here."

CBO, Private University

No Way Around Data Governance

"We're happy we migrated, but it didn't solve our data consistency problems for us. Until we do the hard work of figuring out what we need to measure and getting definitions down, it won't matter what platform we use."

CBO, Private University

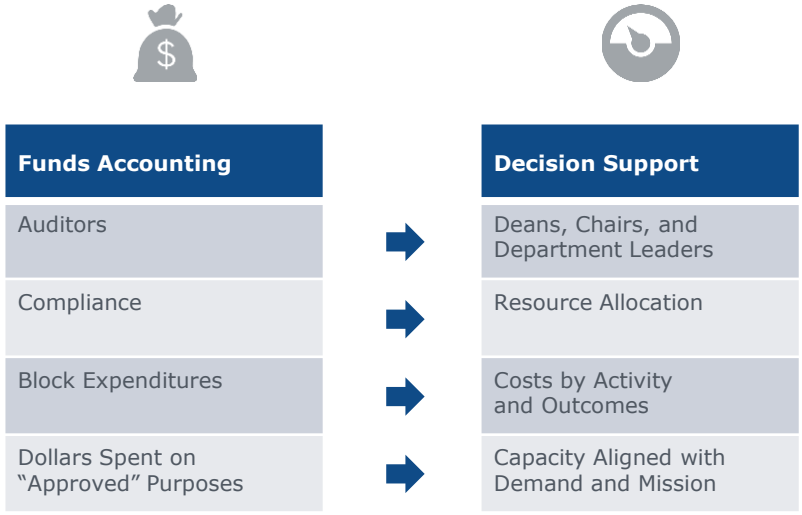
Source: EAB interviews and analysis.

Captive to Funds Accounting

From a technology standpoint, many higher education data systems were set up with funds accounting in mind—not decision support.

In the funds accounting model, the systems are optimized for an audience of auditors and for compliance-related inquiries. Users may see the purpose of funds spent, but they cannot study the productivity or efficiency of investments. This setup obscures granular costs and revenues, which frustrates users trying to make decisions informed by the data.

Reporting Focus Obscures Essential Performance Data



Simply Inadequate

"The separation of performance-related information from financial data prevents a clear understanding of income, expense ,and results. They obscure the true costs of teaching and research, administrative growth or shrinkage, and differences among disciplines. Without such information, institutional managers simply cannot make wise decisions."

Dr. Betty Phillips, Former Provost, Arizona State University

Source: Capaldi E and Abbey C, "Performance and Costs in Higher Education: A Proposal for Better Data," *Change Magazine* (2011); EAB interviews and analysis.

Enterprise Process, Not an IT Project

Analytics efforts are frequently viewed by campus members as IT projects rather than enterprise processes. This view is problematic because it confuses the ongoing and cross-functional nature of BI efforts with the finite and more localized nature of IT projects. Organizations that have framed BI as an information system or tech-enabled capability have struggled to obtain campus member support and implementation assistance.

When campus members view BI as an IT project, they expect an end state and consider their own engagement to be temporary. They may also see any new investments as solely IT's responsibility.

This mind-set can also inhibit campus members with data expertise from providing input to the initiative, as campus members have a tendency to leave technology-related projects "to the experts."

Finally, because many campus members have become sensitized to failed IT projects, they may be more willing and ready to distance themselves from an initiative if they view it as an IT project rather than an enterprise effort.

Framing BI as an IT Project or Technology Issue Sets It Up for Failure

Problems with Viewing BI as an IT Project

1 IT Projects Have an End

While traditional IT projects have an end and are delivered to campus members, BI is a process with no end

2 Campus Members Feel Unskilled

Campus members believe that if it's an IT project, they cannot contribute to the effort's success

3 IT's Got It Under Control

BI is a more expensive endeavor than what IT alone can undertake, and requires investment from multiple campus partners

4 Success Not Assured for IT Initiatives

Campus members have come to expect some IT projects to fail and may give up at early signs of trouble

Source: EAB interviews and analysis.

Data Governance for Performance Management

PART 1

- Hallmark 1: Institutional Ownership of Data
- Hallmark 2: Bicameral Data Governance Committees
- Hallmark 3: Fast-Cycle Decision Frameworks
- Hallmark 4: Pop-Up Data Dictionaries

Setting up for Success

Data from the IT Forum's business intelligence benchmarking survey supports the centrality of data governance as core to successful BI efforts.

Characteristics of institutional approaches to data management and decision making composed a BI maturity index. Participants also self-identified the maturity of their institutions' data governance, based on the scope and formality of the governance efforts.

Although mature data governance does not dictate mature BI, institutions that reported higher levels of data governance maturity also reported higher levels of BI maturity. Interestingly, no institutions that reported having enterprise perspectives on data governance fell below zero on the BI maturity index.

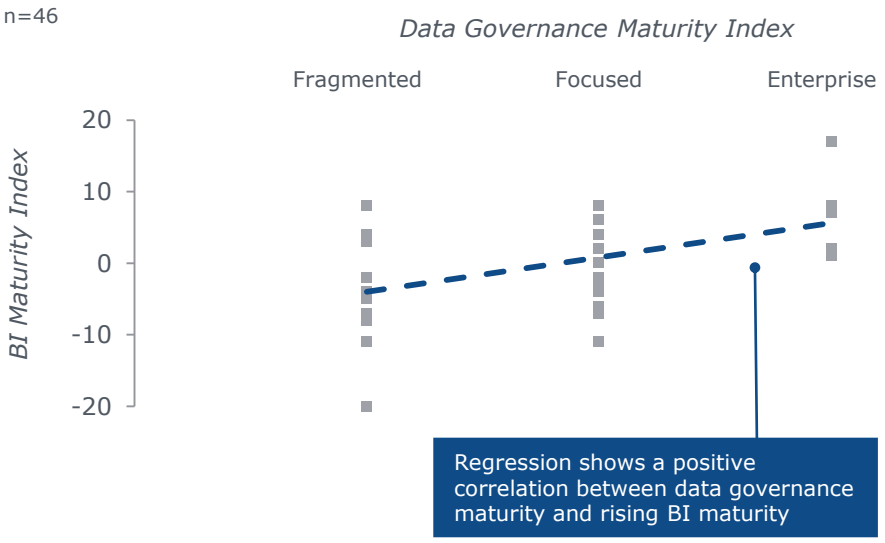
Data Governance Maturity a Clear Correlation with BI Maturity

EAB 2014 BI Survey

Characteristics Determining BI Maturity

- Our data resides in departmental silos -
- Institutionally, data is viewed as a shared asset +
- Decisions are validated with data from central sources +
- We align BI initiatives with institutional priorities +

Enterprise Data Governance Indicative of Mature BI



The Data Governance Maturity Spectrum, Defined:

- *Fragmented*: Zero or few processes govern the input, collection, definitions, usage, and access of data
- *Focused*: Within a narrow terrain (e.g., reporting), policies, definitions and processes exist to maintain data quality and consistency
- *Enterprise*: Common policies and standards are in effect, with centrally managed KPIs directing policy and plan development

Source: EAB IT Forum 2014 BI Survey; EAB interviews and analysis.

Why Am I Here?

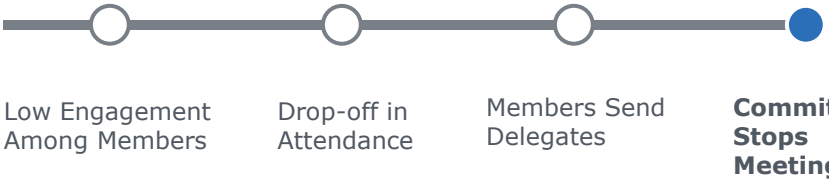
Although many interviewees recognized the importance of data governance, many CIOs also lamented that several data governance efforts on their campuses had failed.

Data governance committee member disengagement serves as a major roadblock for advancing data governance maturity. Committee members cannot connect with many of the terms being discussed, and irrelevance of meetings often leads members to send delegates in their place or stop attending altogether. These failed efforts often discourage campus members from supporting future data governance initiatives.

Data Governance Notorious for Member Participation Drop-Off

Data Governance Committee Meetings Fail to Interest Members

Low Engagement Leads to Committee Disbandment



Source: EAB interviews and analysis.

Laying Down the Law

Data ownership—the idea that data belongs to an individual or a unit rather than an organization—presents another major pitfall for business intelligence efforts, as inaccessible data cannot be integrated with other data sets or analyzed by anyone other than the "owner."

During an effort to identify causes of, and prevent, soldier suicide, U.S. Army leaders struggled with data stewards who claimed ownership over data. These claims ranged from sincere concern over the data's use to generic territoriality over the data.

Given the initiative's urgent mission, the Deputy Under-Secretary of the Army determined that a culture of siloed ownership was no longer acceptable. Data stewards could no longer use the phrase "my data," and anyone who claimed ownership would have to speak directly with the Deputy Under-Secretary to support their claims. To encourage acceptance of more open data, the Deputy Under-Secretary declared that data quality errors would be expected and tolerated—no one would be punished for errors.

With Lives on the Line, No Time for Data Hoarding

Suicide Prevention Effort Data Management Meeting

Army Data Stewards

"My data can only be used for…"

"Our data is bound by certain terms and conditions…"

"I'm not letting others see my data…"

Deputy Under-Secretary of the Army

- Banished the phrase "my data"
- Any people with data ownership questions would have to schedule an appointment with the senior officer of the Army
- Data mistakes will be tolerated (and expected)

Source: Aiken P and Billings JW, "Monetizing Data Management," (2013); EAB interviews and analysis.

Hallmark 1: Institutional Ownership of Data

Hallmark in Brief

Formal documents or policies state the importance of data as an institutional asset and espouse the notion that all university data is owned by the institution rather than by departments or individuals, who act as stewards of the data.

Problems Addressed

A culture of departmental or individual data ownership may cause hoarding of data, as certain campus members decide who may or may not have access to the data and whether the data can be integrated with other data sets or pulled into data warehouses.

Implementation Guidance

Oregon State University

- Institution type: Four-year, public
- Enrollment: 27,900 (23,200 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Small city (Corvallis, Oregon)

University of Kentucky

- Institution type: Four-year, public
- Enrollment: 28,400 students (21,400 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Lexington, Kentucky)

Setting Expectations at the Highest Level

To communicate the importance of data, some higher education institutions have incorporated the idea of "data as a strategic asset" in institutional strategic plans.

Oregon State University's strategic plan lists three institutional goals: "1) Provide a transformative educational experience for all learners; 2) Demonstrate leadership in research, scholarship, and creativity while enhancing preeminence in the three signature areas of distinction; and 3) Strengthen impact and reach throughout Oregon and beyond." The strategic plan also lists three key initiatives needed to reach those goals, one of which is "Recognizing Technology as a Strategic Asset," which discusses the transformative affect that data will have on the university.

Interviewees at Oregon State note that this affirmative statement elevates the necessary work to support these goals (e.g., eliminating data silos), to a place of strategic importance to campus leadership. The statement also helps eliminate campus members' declarations of data ownership.

Incorporating Data—as an Institutional Asset—into the Strategic Plan

Excerpt from Oregon State University's Strategic Plan

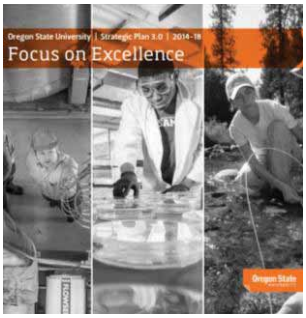


IMAGE CREDIT: OREGON STATE UNIVERSITY

Key Initiatives Needed to Meet Plan Goals:

1. Enhancing Diversity
2. Stewarding OSU's Resources
3. **Recognizing Technology as a Strategic Asset**

Technology as a Strategic Asset

Technology and information occupy a critical role in a 21st century university… Greater accountability, enhanced expectations of a current generation, and growth in the development, management, and delivery of digital resources point to the expanding role that big data, analytics, and information technologies provide as a strategic and enabling asset.

We Will:

Ensure that relevant information is widely shared and strategically used to make effective decisions and measure progress toward achieving university goals.

Source: Oregon State University, "Focus on Excellence, 2014-18;" EAB interviews and analysis.

Sharing Is Caring

To access some reporting tools, such as Tableau Server, University of Kentucky campus members must agree to a set of "Analytics Community Principles." These guidelines promote a culture of collegiality around data use.

The principles identify data as a communal asset that should be shared across campus whenever appropriate, respecting data privacy concerns. The overall message of the principles is clear—a culture of sharing will advance the university's mission far better than a culture of data ownership.

Toward a Common Culture of Data Principles

UK UNIVERSITY OF KENTUCKY

"Analytics Community Principles"
Emphasize Collegiality, Discourage Ownership

Be safe and secure. Respect the acceptable use of information policies and guidelines the university has in place. Please have good passwords and secure your laptop, desktop and other devices appropriately. Treat private student and UK information appropriately.

Be collegial. University data is a community asset and a community of people steward the data. Use and share the data with the best interests of the university community in mind. Since parts of our data analysis environment is designed to allow for greater transparency, analysis will potentially be able to see other unit data. While we will make private to a unit what absolutely needs to be private, the way the university runs its business often involves multiple colleges and units at the same time requiring broad data access. Don't use your access to take unfair advantage of another unit.

Help improve data quality. If you see data that doesn't appear to be correct, let someone know. We have a team of staff dedicated to helping improve data quality. This team can work with colleges and units on any data entry and data management processes that might need to be changed to improve data quality.

Be open-minded and inquisitive. Data can be represented in multiple ways at the same time. While the teams are taking great care to enable multiple views of the data to support the community, you might have a valid and unique perspective. In time, we can accommodate more ways of looking at the same data while not interfering with other views or taxonomies.

Share. The main benefit from open analytics is the power of a community of analysts learning from each other rather than a few select individuals hoarding knowledge or access. As the community improves its knowledge and skill with the data, the university can improve accordingly.

Source: University of Kentucky, "Tableau Server Access Request;" EAB interviews and analysis.

Hallmark 2: Bicameral Data Governance Committees

Hallmark in Brief

Responsibilities for data governance are split between two primary committees: 1) a prioritization committee of executives; and 2) a definition- and access-focused committee of technologists and data custodians who are subject matter experts. This separates senior-level direction setting for data governance from operational execution, helping to increase campus buy-in for data governance efforts while also improving accountability among committee members.

Problems Addressed

Members concentrated into a single data governance committee focus on prioritization and agenda setting and rarely get to execution. Lack of progress during meetings, little or no demonstrated executive support, and delegation of attendance leads to committee member disengagement and, ultimately, failed data governance efforts.

Implementation Guidance

Perils of the Single Committee Structure

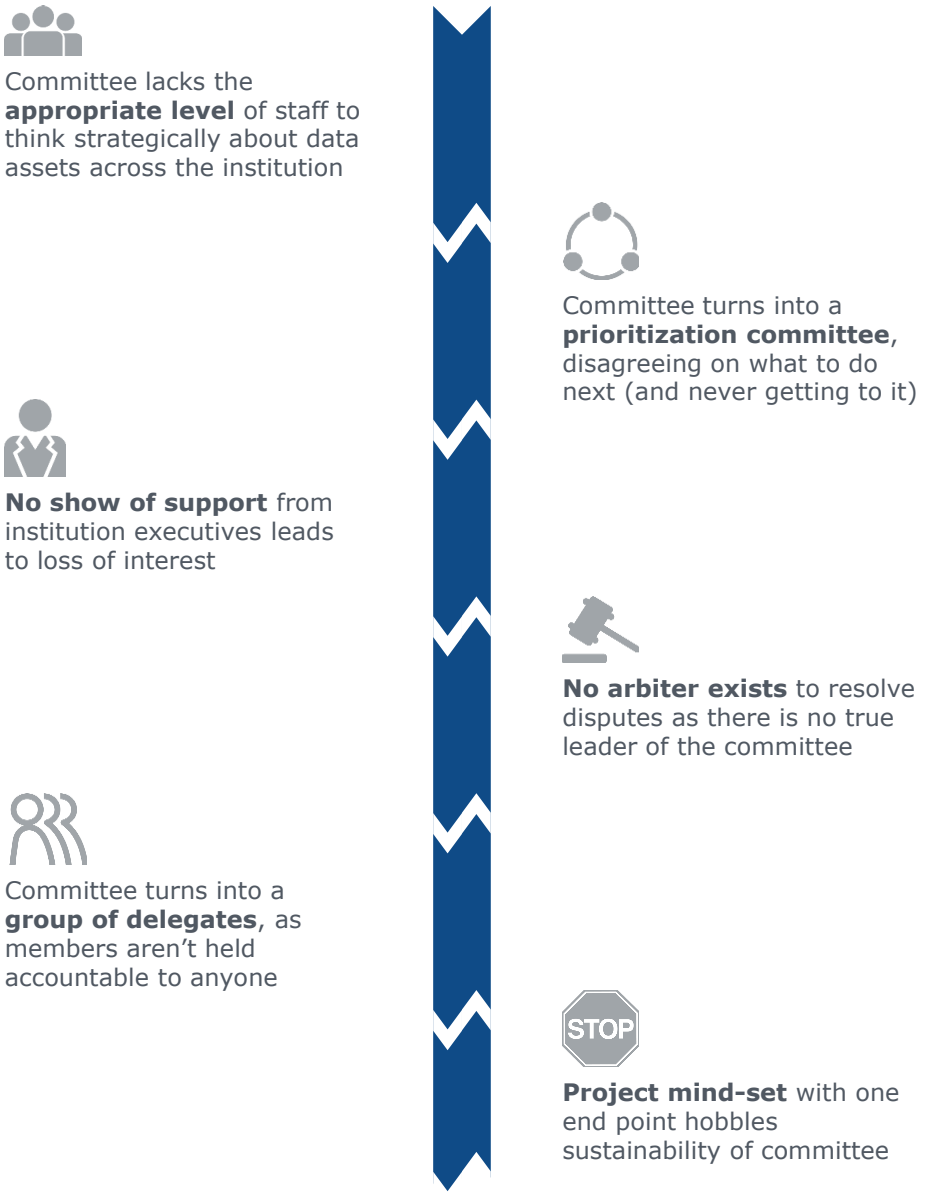
Many institutions seeking fast progress on data governance create just one committee to tackle all data governance needs; however, these single committee models are often structured to fail from the start.

EAB research surfaced many institutions that were on their second or third data governance effort, largely because failed committees derailed earlier attempts. Causes of failure were common across institutions:

- The committee(s) focused too much on planning rather than acting;
- Disputes among committee members went unresolved;
- Members lacked accountability for attendance;
- Members stopped going to meetings or sent delegates too junior to make decisions.

It Only Takes One Failure Point to Break

Member Engagement Crucial to Data Governance Success



Source: EAB interviews and analysis.

Separate Strategy from Operation

The primary reason for single committee failure is neglect to separate strategic thinking from operational execution.

Institutions should structure data governance committees into two main groups: a **prioritization committee** of executives and a **definition- and access-focused committee** of subject matter experts (data custodians).

Data strategy committees represent signal value as much as executive decision making, and the presence of such a group holds data governance committee members accountable for their operational responsibilities. The time commitment for data strategy committee members is relatively light, at one hour per quarter or semester. Members focus on setting the strategic direction for the data governance committee and helping with course corrections when necessary.

A Light, and Lasting, Lift

Data Strategy Committee

- **Role/purpose**: Direction setting (the "what")
- **Seniority**: VP- to AVP-level
- **Composition**: Cross-functional data trustees (IT, Provost's office, CBO's office, Registrar's office, etc.)
- **Size**: 5-10
- **Time commitment**: Minimal (one hour per quarter or semester)
- **Agenda**:
  - *Vision*: What areas of the university may benefit most from better data?
  - *Progress*: What has the data governance committee done since the last meeting, and what should they focus on until our next meeting?

Data Governance Committee

Committee Liaison: A member of the data governance committee (e.g., a data governance director) may sit on the strategy committee to liaise between the groups

Intentionally Small: Few members helps promote group consensus on priority setting

Breakout Sessions: To avoid additional meetings, data governance can be incorporated into already standing executive committee meetings

Dispute Resolution: The group may also resolve data governance committee disputes (e.g., about data access decisions), but this is rarely required

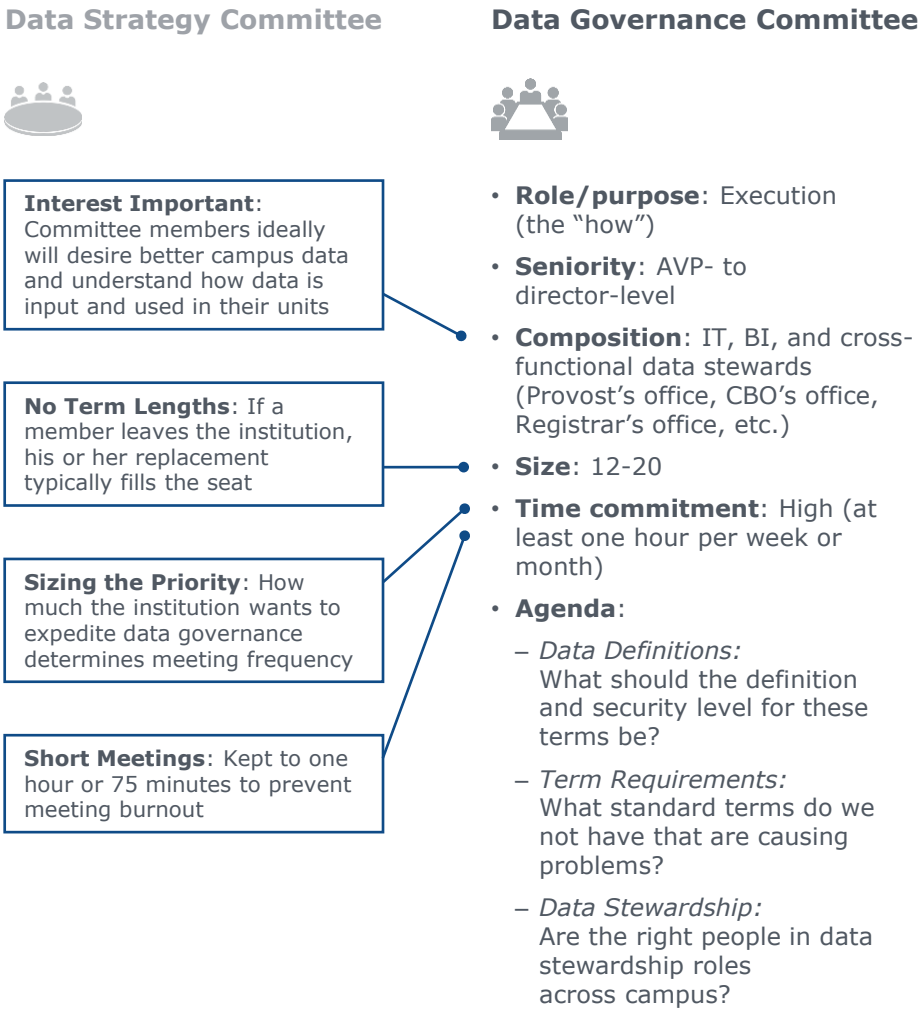
Source: EAB interviews and analysis.

The Legs of the Machine

Once the data strategy committee sets data governance priorities, the data governance committee focuses on execution of those priorities.

For example, if the institution's executives desire better optimization of facilities space, the data governance committee would determine what data fields need to be defined to analyze space optimization, who should have access to those fields, and what new metrics are needed for performance measurement.

Execution Focus Owned by Subject Matter Experts



Source: EAB interviews and analysis.

Hallmark 3: Fast-Cycle Decision Frameworks

Hallmark in Brief

Data governance committee members choose whether to actively participate in creating particular data terms' definitions prior to each meeting, allowing those who have no stake in the specific terms up for discussion to skip that meeting entirely. Those who opt out of a meeting provide their tacit agreement to decisions made in their absence. Participation in meetings is mandatory only for units responsible for a term (e.g., registrar for "student") and data governance staff.

Problems Addressed

Groups convened to determine data definitions include too many members, leading to many terms being irrelevant to a majority of people in each meeting. Committee member disengagement leads to a lack of meeting attendance or delegation of responsibilities to others.

Implementation Guidance

University of Notre Dame

- Institution type: Four-year, private
- Enrollment: 12,100 students (8,500 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large suburb (Notre Dame, Indiana)

Too Many or Too Few People at the Table

Data governance committees often struggle to find the right combination of attendees, with both over-inclusiveness and under-inclusiveness resulting in failed data governance efforts.

When committees are over-inclusive, members spend time in meetings where 50% or more of the conversation is personally irrelevant. This leads to disengagement, attendance drop-off or delegation, and, ultimately, committee failure.

To avoid this, some institutions opt for a leaner approach, but this can be under-inclusive, resulting in subjective decisions, incomplete inputs, future definition revision, and decisions that are not implemented.

Most Committees Failing to Balance Inclusion and Engagement

Over-Inclusive

Unrealistic Time Commitment

- "I'm the AVP of Research. Why am I talking about building codes?"
- "When are we going to get to the terms I actually care about defining?"

Slow to Reach Consensus

- Veto power of one stymies group consensus
- Inefficient to get 20 people to agree to a single definition

Under-Inclusive

Missing Terrain Expertise

- Continued use of local definitions in uninvolved stakeholders' units
- Defined terms require revisions once uninvolved stakeholders speak up

Missing IT Expertise

- Information security officer has concerns about committee decisions
- Committee decisions fail to be publicly documented and disseminated

Source: EAB interviews and analysis.

We're Going to Need a Bigger Conference Room

To create an effective and efficient data governance structure, the University of Notre Dame identified 20 roles across the institution to include in a data governance committee. These roles provide comprehensive coverage of the knowledge required to define terms in ways that would be defensible and acceptable across campus.

Full Range of Organizational Authority and Data Expertise Included

UNIVERSITY OF NOTRE DAME

Invitation to Participate in Data Governance

To:

IT

- Data Governance Director
- Sr. Dir. of IT Service Delivery

IR

- Dir. of Strategic Planning and IR

Academic/Research

- Dir. of Budget and Planning (Provost Office)
- AVP of Research
- Sr. Assoc. Registrar

Student Affairs

- VP of Student Affairs
- AVP of Undergraduate Enrollment
- Lead Advisor, Office of VP for Mission Engagement
- Sr. Dir. of Finance and Administration (International)

HR

- Dir. of HR
- Manager, Payroll Services

Business/Finance

- Sr. Advisor to the Executive VP
- Asst. Dir. of Budget and Financial Planning

Advancement

- AVP and Exec. Dir. of Development

Security/Risk/ Legal

- Chief of Police
- Dir. of Risk Management
- Associate General Counsel

Athletics

- Sr. Assoc. Athletic Director
- Athletics Compliance Program Dir.

Source: EAB interviews and analysis.

Rightsizing Roles for Each Definition

While most institutions expect full attendance at every data governance meeting, the University of Notre Dame takes a different approach. Committee members choose whether or not to be actively involved in defining each term. Attendance is non-negotiable only for people who are explicitly responsible for terms discussed (propose role) and data governance staff (document role); attendance only becomes mandatory for any committee member who opts in. Members who opt out give their tacit agreement to the committee's decisions.

The University leveraged a RACI matrix (repurposed at right) to divide members' responsibilities into four roles—propose, document, consult, and agree. While certain roles are codified (stewards must propose some term definitions), all remaining committee members self-select their roles through a survey, based on the terms presented for discussion in the next meeting.

Like flipped classrooms, this model benefits from work being done before meetings. The proposers draft definitions ahead of time with other subject matter expert input and coordination with the Data Governance Director. The convened group then discusses, revises, and finalizes the definitions.

Committee Members Choose How Involved (or Not) to Be

Four Banded Roles Determine Participation Level[1]

Variable by Term Family: Data steward for relevant term (e.g., Registrar for "student") acts as proposer

Permanent Role: Data governance director always maintains this role; acts as neutral party

Propose: Presents group with draft definition and security level • Consults local definitions • References IPEDS *Expected time per term: 18 minutes*	**Consult:** Helps refine definition • Provides technical advice • Identifies logistical considerations *Expected time per term: 8 minutes*
Document: Helps draft term; records decisions • Updates data dictionary; creates technical definition for data warehouse *Expected time per term: 18 minutes*	**Agree:** Recuses from final decision; does not attend meeting • Agrees with committee decision *Expected time per term: 0 minutes*

Opt-in Privileges: Members may choose to participate or not, but if not, they provide their *tacit agreement* to the committee's decisions

1) EAB composite inspired by the University of Notre Dame's RACI matrix for data governance.

Source: EAB interviews and analysis.

The Matchmaking Game

The bounded decision roles for data governance meetings at the University of Notre Dame help the committee achieve goals of not wasting personnel time while also not excluding critical perspectives. The example self-nomination grid at right shows how committee members may choose their roles for each term, optimizing their engagement in meetings by only opting in for terms in which they have an interest.

Benefits of this process include personnel time savings (members who opt out need not attend all meetings) as well as efficiency (terms only need to be defined once since everyone signs off on meeting decisions—even those not present).

Matching the Right Stewards to the Right Terms

Opt-Out Decisions as Interesting as Opt-In Decisions

Legend:

P=Propose D=Document C=Consult A=Agree

Term	Data Gov. Director	Registrar	Strategic Planning and IR	HR	Student Affairs	Athletics
Credit-Bearing Student	D	P	C	-	A	-
Full-Time/ Part-Time Indicator	D	-	-	P	-	-
Birthdate	P/D	C	C	C	-	A
Academic Standing	D	P	A	C	A	C

Generic Terms Owned: Data governance director owns proposal for terms with no obvious owner, like "Birthdate."

Major Time Savings: Only HR and data governance director sign up for "Full-Time/ Part-Time Indicator;" no other committee members need to meet to define term.

Counterintuitive Results: Student affairs only desires input in 10% of student enrollment-related terms.

Errors Avoided: Athletics desires input into "Academic Standing;" group avoids need to redefine term later.

Source: University of Notre Dame; EAB interviews and analysis.

100% Buy-In with 20% Effort

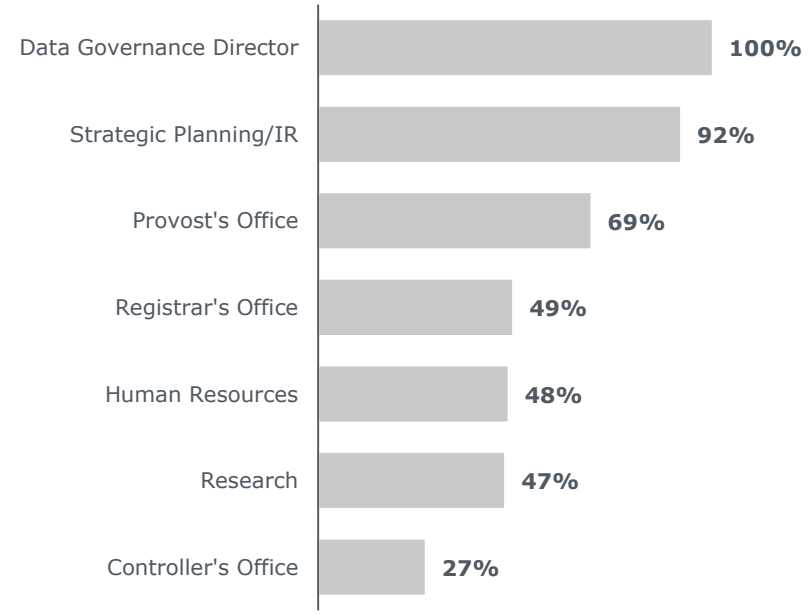
The University of Notre Dame found that the data governance committee was able to achieve group consensus on the terms it defined while having fewer than a quarter of its members at each meeting.

Only three roles opted in to participate in definition creation for over half of the past year's terms—the data governance director; a representative from the strategic planning and IR office; and a representative from the provost's office. The majority of the committee members opted to participate in defining fewer than 10% of the discussed terms.

Most Committee Members Help Define Fewer Than 10% of Terms

Propose, Document, or Consult—Involvement by Function

Most Involved Functions



Least Involved Functions

Fewer Than 10%

- Student Financial Services
- Budget Office
- International
- University Relations
- IT
- General Counsel
- Student Affairs

Fewer Than 2%

- Athletics
- Undergrad Admissions
- Mission Engagement
- Graduate School
- Security/Police
- Risk Management

Source: University of Notre Dame; EAB interviews and analysis.

A Win-Win-Win

The University of Notre Dame's processes have led to highe-quality definitions with lower resource consumption than the typical model for data governance committees.

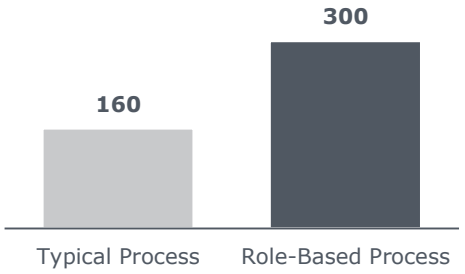
By having the right people in the room at the right times, the University is swiftly capturing all of the desired inputs and generating good definitions. The committee is able to define terms faster, and the defined terms require fewer revisions from dissatisfied stakeholders.

Members attending only the meetings relevant to them has led to sustained engagement with the committee, which has defined over 300 terms.

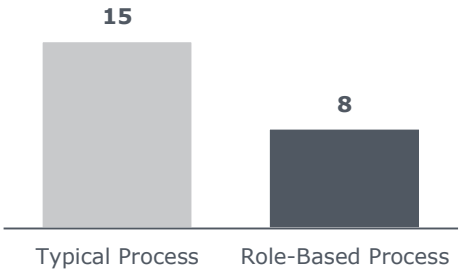
Seeing Results in Engagement, Efficiency, and Effectiveness

Maintaining Momentum

Terms Defined per Year



Minutes Defined per Term



118

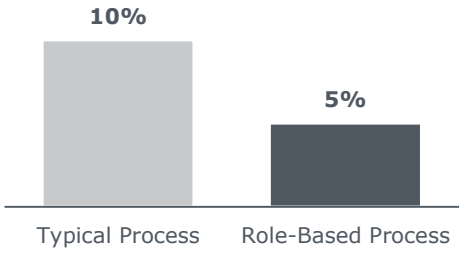
defined faculty headcount and profile-related terms

79

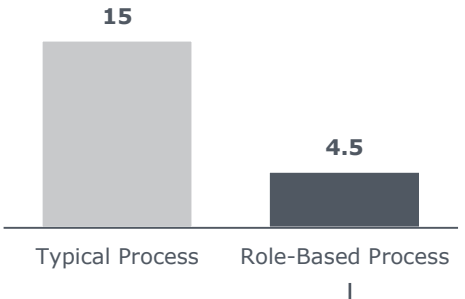
defined course registration-related terms

Better Decisions with Less Effort

Terms Requiring Revisions



Number of People in Each Meeting



580+

director-level and above staff hours saved per year

10

maximum number of people interested in defining an individual term (half the total potential committee size)

Source: EAB interviews and analysis.

Hallmark 4: Pop-Up Data Dictionaries

Hallmark in Brief

BI team members create and maintain data dictionaries that are publicly accessible, easy to find, comprehensive in detail, and nontechnical in order to overcome data denial from end users. Further resources, such as data FAQs and pop-up prompts, exist within reporting platforms to address questions about data sourcing, effective dating, data custodianship, and more.

Problems Addressed

Data consumers lack transparency about metadata—information about the data terms and fields—for data in reports and dashboards. Lack of visibility into factors about data's age, source, unit of measurement, and so on can create skepticism and mistrust of institutional data. The resulting data denial can lead to low adoption of central data and reporting tools and the persistence of shadow systems.

Implementation Guidance

University of Nevada-Las Vegas

- Institution type: Four-year, public
- Enrollment: 27,800 students (23,100 undergraduates)
- Carnegie classification: Research university (high research activity)
- Campus setting: Midsized city (Las Vegas, Nevada)

Arizona State University

- Institution type: Four-year, public
- Enrollment: 48,700 (38,700 undergraduates)
- Carnegie classification: Research University (very high research activity)
- Campus setting: Midsized city (Tempe, Arizona)

Oregon State University

- Institution type: Four-year, public
- Enrollment: 27,900 (23,200 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Small city (Corvallis, Oregon)

Overcoming Data Denial and Inquisition

Higher education institutions are a naturally skeptical environment, and most pushback about data is due to a lack of trust in the data itself. To overcome this data denial, most institutions have created data dictionaries.

However, many higher education institutions' data dictionaries fail to properly serve campus members. The dictionaries may be stored in Excel files that are not accessible to all campus members or be written for technical experts rather than laypeople.

Objections Coming from All Angles

Campus Members Lacking Data About the Data

Data Definition

What does the title of this metric mean? How is each metric defined?

Business Logic

What was the formula or coding used to derive the numerical value of this metric?

Effective Dating

When were these data last updated? To what time range do these metrics apply?

Access and Privacy

Who can view this data? What restrictions are in place and what is their rationale?

Data Sourcing

From where is this data drawn? Who ensures its accuracy? Who inputs the original figures?

Data Dictionaries Often Structured in Unhelpful Ways

Hard to Find

- Not publicly accessible (e.g., on a personal drive)
- Publicly accessible, but hidden unintentionally

Hard to Understand

- Not comprehensive in detail
- Too technical for most campus members

Source: EAB interviews and analysis.

Keeping Everyone on the Same Page

The University of Nevada-Las Vegas's data dictionary hits all the elements of a skeptic-proof resource that users can understand and trust. The metadata is easily accessible and comprehensible.

The data dictionary is web-based, and it can be found on the Office of Decision Support's website. Users can find it through a search engine and can bookmark the website.

The dictionary does not simply include the term and the definition but also includes further interpretation and usage notes, the kind of values that are acceptable for the term, the mechanism for pulling the term (in technical and nontechnical language), and the review status of the term.

Critical Elements That Bullet-Proof Your Data Definitions

Example Term: Degree Level (Student)[1]

UNLV

Field	Description
Term	Degree Level (Student): The educational level of the degree a student is pursuing.
Interpretation/ Usage Notes	Degree Level (Student) is identified by a numeric two digit code representing the educational level of the degree(s) a student is pursuing. For example, all bachelor degrees are identified as 13, graduate certificates as 14, master degrees as 17, educational specialists as 18, and doctoral and professional degrees as 21. If no degree is associated with an academic plan, the field is blank.
Potential Values	The EDUCATION_LVL is defined in the PSXLATITEM table. The following are currently used values. If no degree is associated with an academic plan, the field is blank. 13 - Bachelor Degree 14 - Post Bachelors 17 - Master's Degree 18 - Post Master's 21 - Doctorate Degree
Source Description	*Provides source system information in SQL and with textual interpretation.*
Related Terms	Degree (Student); Degree Name (Student); Is Student Doctoral
Current Status	Under Steward Review

1) From the University of Nevada, Las Vegas' data dictionary.

Source: University of Nevada, Las Vegas Data Dictionary, https://ir.unlv.edu/DD/Browse/DataDefs.aspx; EAB interviews and analysis.

Brace Yourselves

When standardizing definitions, data governance groups should expect lengthier conversations for some terms than for others. Three kinds of terms may generate the most conversation:

- Terms with no natural owner;
- Terms that have several definitions not only across campus but also across external organizations with which the institution interacts;
- Terms that are used for both faculty and staff but have different meanings for each group.

For general terms lacking a clear owner, data governance directors may act as a neutral party to own the term. For terms with existing external definitions, data governance groups should create a single definition for all internal stakeholders and only use external definitions with the specific agencies to which those external definitions relate. Terms shared between faculty and staff may require different definitions that are specialized for each group.

Expect Lengthy Conversations for These Terms

General Terms with No Clear Owner

Example Terms:

- Birthday
- Gender
- Religion
- Phone Number
- Address
- Marital Status
- Name

Terms with Existing External Definitions

Example Terms:

- Graduation Rate (e.g., IPEDS, state higher education commission, National Student Clearinghouse)
- Ethnicity (e.g., IPEDS, U.S. Equal Employment Opportunity Commission)
- Distance Education Course (e.g., IPEDS, state university system)

Terms "Shared" Between Faculty and Staff

Example Terms:

- Appointment
- Promotion
- Active Status

Source: EAB interviews and analysis.

Shining Light on Data Sourcing

Arizona State University identified the six most frequently asked questions about data and included them in the Open Source Data Library, an online database accessed directly from reports.

Arizona State University's University Technology Office has found that publishing these pieces of information has significantly reduced requests made of the University Technology Office. Metadata transparency also encourages users to place more faith in the displayed data.

Data FAQs Address Objections at Point of Use

Enrollment Dashboard > Course Capacity Details > College B[1]

Course	M	T	W	Th	F	Sa	Su	Start	End	Total Enrolled Seats	Total Seat Cap	Percent Enrolled
Materials Science 301	X	X	X					10:00A	11:00A	24	25	96.0%
Silent Film in the 1930s		X		X	X			1:00P	2:00P	10	10	100.0%

Information About This Report

- **What are these KPIs about?** – Contextual information for currently displayed data, indicating details such as the department or unit the data covered.
- **How often is this data updated?** – Data latency information.
- **Who has access?** – Information on access restrictions for dashboards containing sensitive information (e.g., professor salaries).
- **Who are the data trustees of this report?** – Points of contact in case of errors or disputes about the data.
- **What are the data sources for this report?** – Details regarding collection points for data.
- **What is the SQL logic used?** – An extra layer of source detail on the SQL coding that precisely indicates exactly how the system "pulls" data from the central repository.

1) Illustrative.

Source: EAB, "Developing a Data-Driven University," (2010); EAB interviews and analysis.

In-Your-Face Metadata

Oregon State University takes metadata provisioning a step further by making detailed metadata within every report accessible through clicking on columns and fields.

To do this, IT staff built a simple HTML- and jQuery-based function in the University's reporting web application. When users hover over the report, they are prompted to "click to view metadata." Clicking on a column brings up instant information about what that field means (rather than directing users elsewhere to find a data dictionary). In addition, users hovering over a calculated field can see the calculation that populated that field.

This simple add-on helps campus members better understand and use data for decision making.

Instant and Obvious Data Transparency

Pop-Up Metadata

- Mouse-over prompts user with "Click to view metadata"
- Report data traceable back to source forms, easing report validation and increasing trust in data
- Function built in a web application using HTML and jQuery

Further Insight Available

Hovering over calculated fields will show the user the actual calculation (e.g., if the Six-Year Cohort Graduation Rate is 63.15 percent, a mouse-over will show the figures that created that number).

Source: Oregon State University, EAB interviews and analysis.

Data Quality Tolerance

PART 2

- Hallmark 5: Accountable Data Stewards
- Hallmark 6: Automated Data Quality Testing
- Hallmark 7: Fast-Turnaround Error Check Reports
- Hallmark 8: Unit-Level Data Quality Scorecards
- Hallmark 9: User-Friendly Data Entry Instructions

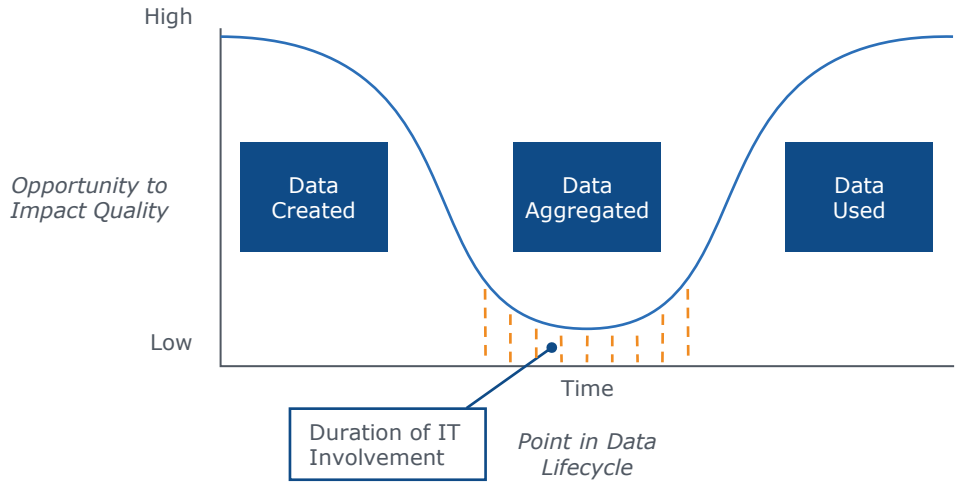
Out of the Loop, but Getting the Blame

IT is often charged with improving data quality, but IT is typically not the creator of data nor the user of data. These two moments—creation and use—offer the most opportunity to impact data quality. Data aggregation, often an IT responsibility, has a low opportunity to improve data quality, but that is where IT is most involved.

End users have a disproportionate opportunity to improve or diminish data quality during data creation and data use. Data quality improvement efforts that depend solely on IT are therefore structured for minimal success. Joint efforts between end users and IT are likelier to achieve lasting success.

IT in Poor Position to Identify Problems

IT's Role Offers Low Opportunity to Improve Data Quality Alone



Missing Out

"There are two interesting moments in the lifetime of a piece of data: the moment it is created and the moment it is used. Quality, the degree to which the data is fit-for-use, is judged at the moment of use."

Tom Redman, the "Data Doc" and President of Navesink Consulting Group

Source: Redman T, "Break the Bad Data Habit," *Harvard Business Review* (2012); EAB interviews and analysis.

Workarounds Lead to Data Dead Ends

Systems' interfaces are often not optimized for collection of high-quality data. Staff often create workarounds in data entry to bypass barriers to progress.

EAB uncovered many stories of data entry circumventions, from using defined fields to store unrelated data to choosing an incorrect value to get past a required field. These workarounds, while convenient to data entry staff, often lead to frustrations for those who wish to analyze the data.

Systems' Data Capture Not Designed for Completeness or Accuracy

End User Convenience Derails Institutional Usefulness

"We found that data fields in Banner… have been repurposed for other uses, such as using a **State/Province field to enter an advisor's first and last initial**."

"We… have one year of data where the **high school for many applicants is listed as "Miscellaneous High School."** This happened because the high schools weren't in the system and the people entering data couldn't add new high schools."

"We were missing student states of residence and zip codes, **making any kind of geographic analysis impossible**."

"When staff couldn't figure out where to input data in the ERP, they started storing data in common fields. For something as simple as double majors, it's clear where you list a student's major, but no one figured out where to store a second major, so that data lives in an open field… **We couldn't even report to deans or department chairs who was enrolled in their programs**."

Source: EAB interviews and analysis.

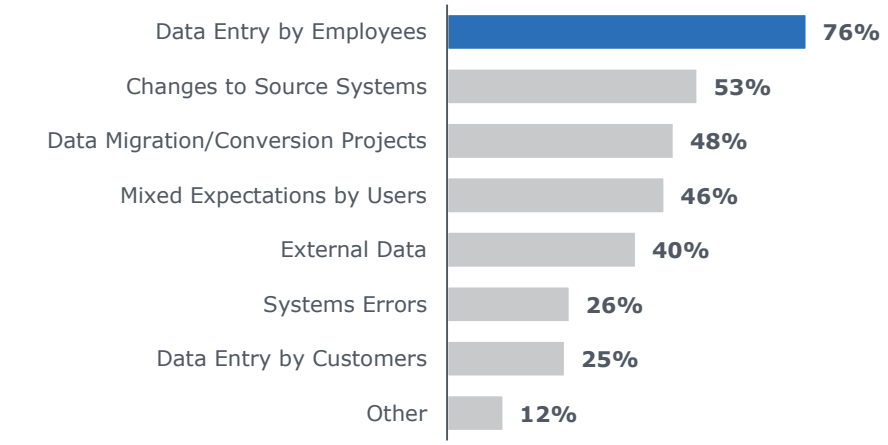
Fat Fingers No Small Problem

Unintended human errors are also problematic for data quality; a survey by The Data Warehousing Institute found that 76% of data quality issues are driven by mistakes by data entry staff.

These simple errors may have major consequences even beyond internal analysis problems. For example, one university's *U.S. News & World Report* designation as the university where students graduate with the most debt was caused by data entry errors.

The Butterfly Effect of Data Input Errors

Respondents Citing Issues as Drivers of Data Quality Problems



Typing Error Causes Trader to Lose $225 Million

Mizuho Financial Group Inc.'s brokerage arm intended to sell one share of stock for 610,000 yen; instead sells 610,000 shares for one yen each.

Data Entry Error Causes University to Obtain Top *U.S. News & World Report* Ranking… for "Most Debt"

A Florida Gulf Coast University employee's error caused the university to submit average debt of $56,208, over $30,000 off (discovered too late to update print publications).

Data Entry Mistakes Cause False Military Statistical Claims

U.S. military publicized a 7% drop in attacks in Afghanistan in 2012, only to rescind the claim upon discovery of data entry errors.

Source: Eckerson W, "Data Quality and the Bottom Line," TDWI (2001); Burns R, "APNewsBreak: Talaban Attacks Not Down After All," AP (2013); Hyuga T, "Mizuho Says Trader Error to Cost It at Least $224 Mln," Bloomberg (2005); Breitenstein D, "Error Vaults FGCU to Top of U.S. News' 'Most Debt' List," The News-Press (2014); EAB interviews and analysis.

Private Industry Paying Out on Data Quality

Poor quality data leads to billions of dollars of waste each year, from mailings to incorrect addresses to undercharging customers, and private companies have taken action to improve data quality.

Many companies for whom data is a core asset, from finance to information services, hire staff dedicated entirely to improving organizational data quality. Companies also embed data governance and data quality audits into project management office consultations.

And companies explicitly pay for improved data quality, as well. Some firms offer incentive bonuses to staff who meet organizational data quality goals. Others offer clients discounts or rewards for high-quality data provided to the organization or for alerting the organization to data quality errors.

Recognizing Data Quality as a Differentiator

Resourcing It

Many companies, such as Allied Irish Bank, hire data quality managers and data quality analysts to form data quality teams

Embedding It in Responsibilities

Booz Allen Hamilton has embedded data governance and data quality profiles into project management office consultations

Incentivizing Staff

TeleTech gives staff bonuses if they meet personal data quality goals tied to company data quality goals (e.g., 50% reduction in defects)

Incentivizing Customers

National Council on Compensation Insurance's (NCCI) Data Quality Incentive Program lowers data management fees for data providers with high-quality data and increases fees for providers with inferior quality data

Source: Spears M, "An Overview of Data Quality," NCCI (2014); "Beyond Six Sigma Data Quality: The KFR Inc. Story," Data Quality Pro (2008); EAB interviews and analysis.

Are BI Teams Getting Ahead of Themselves?

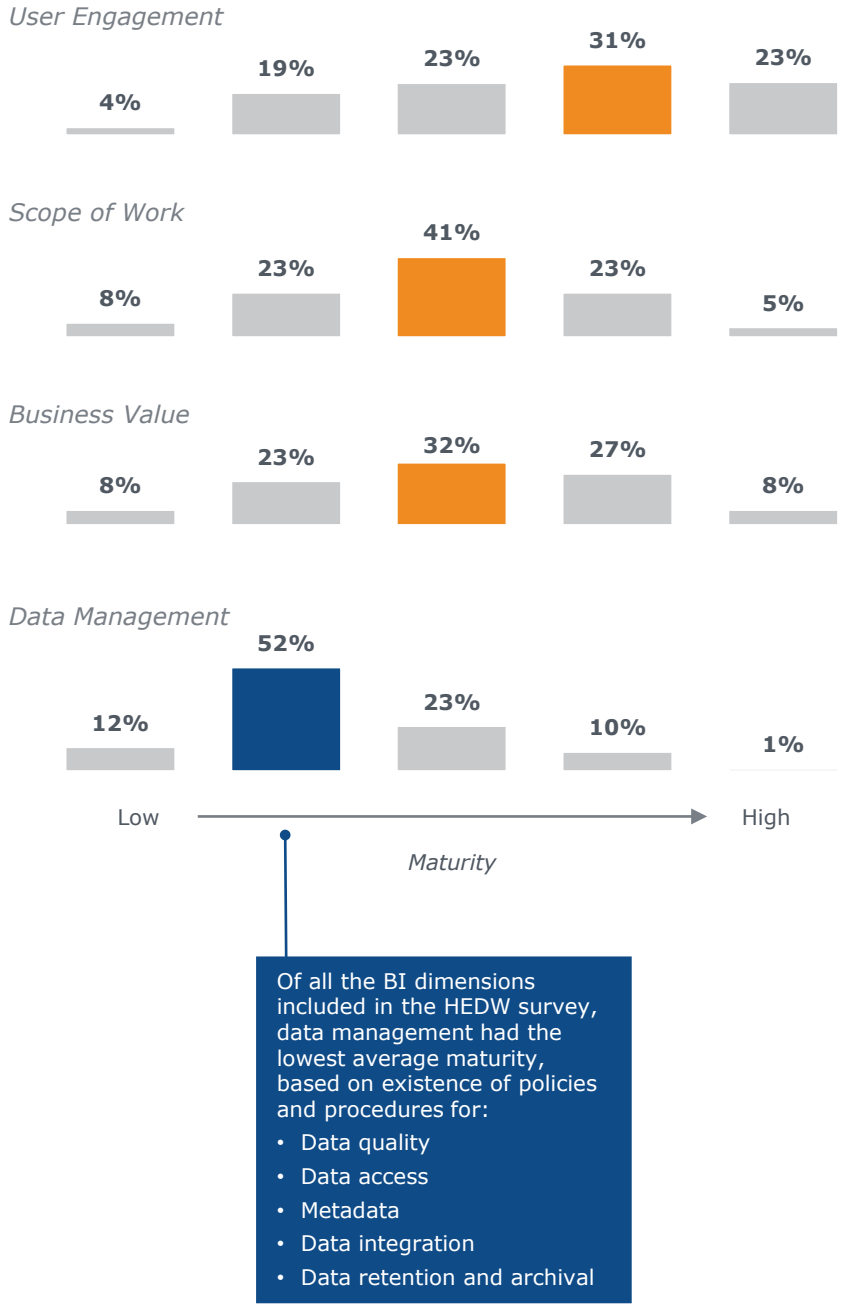
As institutions advance business intelligence efforts, they focus on technologies, user engagement, and adoption, but less so on data management—a core requirement for BI success.

A 2014 survey by the Higher Education Data Warehousing Forum found that data management (e.g., data quality, data integration, metadata governance) lagged well behind other dimensions of BI maturity. Out of nine BI maturity dimensions, data management had the lowest average score across over 200 respondent institutions.

Data Management Lagging Behind Other Dimensions of BI Maturity

HEDW BI Maturity Assessment Results (On Five-Point Maturity Scale)

n=209



Source: "BI Maturity Assessment," Higher Education Data Warehousing Forum (2014); EAB interviews and analysis.

Hallmark 5: Accountable Data Stewards

Hallmark in Brief

Formal job descriptions used in hiring and staff evaluations contain explicit description of data stewardship responsibilities. Staff with substantial data governance responsibilities, such as those serving on a data governance committee, may choose to include data stewardship within their performance reviews.

Problems Addressed

Data stewardship responsibilities for most campus members are side-of-desk tasks. As staff are typically assessed in performance reviews on their productivity towards formal objectives, few or no incentives exist for staff to dedicate time and effort to data governance.

Implementation Guidance

University of Washington

- Institution type: Four-year, public
- Enrollment: 43,800 students (29,800 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Seattle, Washington)

The George Washington University

- Institution type: Four-year, private
- Enrollment: 25,300 students (10,400 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Washington, District of Columbia)

Achieving Universal Coverage

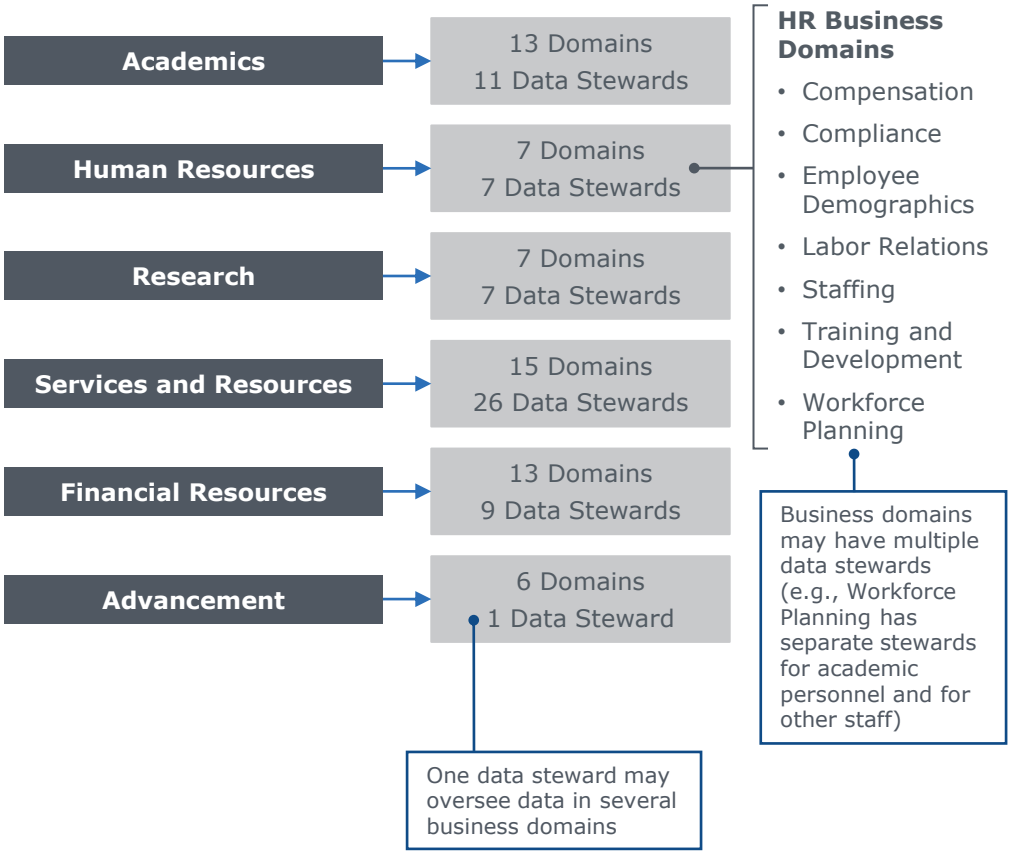
To determine the data stewards across campus required for data governance, the University of Washington first created a map of the data types that required governance. To create this map, an initial data governance committee, with members chosen by university executives, started by breaking down data into major categories (e.g., human resources) then into business domains (e.g., compliance). The group created 61 business domains and assigned a data steward to each domain (with some stewards responsible for multiple domains).

The data map evolved to serve as a directory for campus members to quickly identify and contact the data custodian for a term for which they have questions.

Data Census Reveals Stewardship Needs

University of Washington's "Data Map"

Subject Areas (plus Master Data across all areas)



Source: University of Washington, "The UW Data Map;" EAB interviews and analysis.

Formalizing Stewardship

Data stewardship can be a thankless role, because it is usually outside of individuals' typical job responsibilities, and there can often be more chastisement for stewardship shortcomings than rewards for success. In addition, many staff whose core jobs are assessed on productivity find that data governance efforts typically take time away from more formal responsibilities, hindering their ability to meet productivity goals.

George Washington University has taken steps to formalize data stewardship responsibilities into job descriptions.

Data Responsibilities Built into Job Descriptions

Clear Expectations for Data Stewardship

1 Responsibilities

- Attend stewardship group meetings
- Develop data definitions and access policies
- Log and work to resolve data quality issues
- Review data sharing requests
- Ensure data definition implementation

2 Required Skills

- Knowledge of business processes' relationships with data
- Flexibility to view data as a university resource
- Ability to work within a team
- Ability to communicate effectively to create data policies, answer data questions, and encourage proper use of data

Source: George Washington University, "Data Stewardship Responsibilities;" EAB interviews and analysis.

Informally in Formal Evaluations

George Washington University has not only included data stewardship in job responsibilities, but also plans to incorporate data stewardship performance into annual personnel assessments. Data stewards may include data governance-related goals in their annual assessments. The process is voluntary, so staff need not do so if they do not desire to include such a goal. However, this will help recognize the efforts that staff put into data stewardship, meaning it's no longer an unfunded mandate, but a rewarded responsibility.

The U.S. Department of Homeland Security also offers incorporation of data governance responsibilities into performance reviews. The data governance director writes appraisals of committee members' contributions to agency data governance, which members may share with their supervisors to include in performance reviews.

What Gets Measured Gets Managed

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

Personal Goal Setting at George Washington University

- Staff assessed on up to five individually chosen goals that support the institution's or their department's goals and priorities
- Data stewards may include data governance-related goals for assessment in their annual reviews

Governance Leadership Feedback at U.S. Department of Homeland Security

- Employees assessed on six core competencies, including achieving results, teamwork/cooperation, and communications
- Data governance director—not the stewards' direct managers—writes a brief appraisal of data stewards' contributions for inclusion in their performance reviews

Source: EAB interviews and analysis.

Spot Cleaning Not the Solution

The typical approach to cleaning poor-quality data occurs outside of source systems, perpetuating data quality problems. When cleanup is performed on frozen data, the source data remains of poor quality for future users. This causes a never-ending need for duplicative cleanup work. In addition, campus members may believe IT is responsible for the poor data quality, even if IT was uninvolved in data input.

Spot cleaning outside of the source system also leads to data denial from campus members. Without source system cleanup and visibility into that cleaning process, campus members pulling similar reports will obtain inconsistent numbers.

Downstream Fixes Don't Solve the Pollution Problem

Typical Approach to Data "Cleanup" Neglects Source System

Source: EAB interviews and analysis.

Hallmark 6: Automated Data Quality Testing

Hallmark in Brief

IT staff create an error identification system to monitor data entering the institution's data warehouse. IT staff code business rules to identify potential data errors and their provenance in source systems. The system flags exceptions to coded rules (e.g., student age cannot be below 14) and cross-validation failures (e.g., state and zip code do not correspond).

Problems Addressed

Systems are often not designed for consistent data entry institution-wide, allowing staff too much or too little flexibility when entering data. Without a process for ongoing identification of data quality issues, errors persist in source systems.

Implementation Guidance

University of Maryland-Baltimore County

- Institution type: Four-year, public
- Enrollment: 13,900 students (11,100 undergraduates)
- Carnegie classification: Research university (high research activity)
- Campus setting: Large suburb (Baltimore, Maryland)

Highlighting Data Anomalies

Records that include invalid or unacceptable values for critical data elements cannot be used for analytics purposes, as they would provide incorrect results. Identifying data anomalies in an automated fashion allows business intelligence staff to quickly pinpoint inaccurate and invalid data and exclude that data from entrance into a data warehouse.

Source systems may be enhanced to include guardrails to lessen improper data entry (e.g., drop-down menus, invalid entry alerts, required fields), but these may not be possible to implement in all systems.

To automate identification of data anomalies and entry errors in source systems, IT staff may check for exceptions to designated rules for valid entry or reference data against other data fields to test for violations of coded logic.

Exception Reporting and Cross-Validation Tests

Anomalies Detrimental to Data Analysis

Testing Method	Type of Anomaly	Sample Source System Rule	Example Data Entry Error
Exception Reporting	*Value Falls Outside of Valid Range*	• Acceptable values for "class" are 1 (First-Year Student) through 7 (PhD Candidate)	• Class: 22
	Entry Is Not an Acceptable Value	• U.S. state must be one of 51 valid options	• State: CI
	Invalid Data Attributes	• Age must be numeric, less than or equal to three digits	• Age: W23
Cross-Validation Tests	*Entry Violates Logic When Referenced Against Other Data*	• Simple: Zip code must match state	• ZIP: 55409 • State: MI
		• Complex: Greek life status, varsity sport activity, and sex should agree	• Sorority status: Active • Female sport status: Active • Sex: M

Source: EAB interviews and analysis.

Check, Please!

The business intelligence team at the University of Maryland, Baltimore County has created over 200 SQL-based exception reports for fields that are violated regularly enough to warrant automated oversight. The team started with exception reports for human resources and student data and has expanded its efforts to other functions such as advancement and facilities. Institutional stakeholders (e.g., institutional research, data stewards) may request the creation of new exception reports.

Over 200 SQL-Based Error Checks and Growing at UMBC

UMBC
AN HONORS UNIVERSITY IN MARYLAND

Spotlighting Errors in HR and Student Data Just the Start

Example HR Error Checks

- Null termination date with inactive employment status
- Invalid range for individual's FTE (0-1)
- Full- or part-time not indicated
- Annual salary is out of range ($0-$250,000)
- Date tenure achieved is in the future

Example Student Records Error Checks

- Invalid student ID number (EMPLID)
- Student's academic plan has an invalid degree code
- Unknown education level for degree
- Discrepancy exists between withdraw code and withdraw date

239

Data quality checks occur nightly during the ETL process at UMBC, with more in development

Source: University of Maryland, Baltimore County; EAB interviews and analysis.

Hallmark 7: Fast-Turnaround Error Check Reports

Hallmark in Brief

Based on the automated error checks from the previous hallmark, IT sends out daily emails to functional unit staff describing potential data entry errors from the prior day. Emails provide all the necessary details for staff to identify the questionable field and determine whether the data should be changed in the source system. Staff agree to fix any errors within one day of receiving an error email to promote confidence in the quality of institutional data.

Problems Addressed

Data entry staff lack awareness of errors in data input. Data entry errors are typically fixed in frozen data rather than in the source system, perpetuating source system errors and leading to duplicative cleaning of incorrect data. Campus members lack confidence in data because they question its quality.

Implementation Guidance

University of Maryland-Baltimore County

- Institution type: Four-year, public
- Enrollment: 13,900 students (11,100 undergraduates)
- Carnegie classification: Research university (high research activity)
- Campus setting: Large suburb (Baltimore, Maryland)

Wichita State University

- Institution type: Four-year, public
- Enrollment: 14,400 students (11,700 undergraduates)
- Carnegie classification: Research university (high research activity)
- Campus setting: Large city (Wichita, Kansas)

Pushing Errors to Appropriate Users

An automated data quality testing system lacks utility unless functional staff are involved in the creation of logic as well as in error correction within source systems.

Once Institutional Research staff identify fields with recurring data quality problems, they communicate with functional staff to isolate information necessary to properly code an error check for that issue. IT staff then write an SQL statement that is incorporated into nightly quality checks run during the ETL process.

Daily emails containing error report information are automatically sent to appropriate end users (e.g., human resources for HR data problems) who can fix the identified problems in the source systems.

Making Data Staff Aware of Problematic Data Fields

UMBC
AN HONORS UNIVERSITY IN MARYLAND

Data Error Reporting Process

Automated Data Quality Testing

1 IR staff identify a potential data quality error (e.g., through data review, discussions with users)

2 IR works with functional unit staff and IT to identify the information needed for identification and fix

3 IT staff create a SQL statement; incorporate query into nightly quality checks

4 Nightly ETL process occurs, with error checks written into the ETL process

Error Check Follow-Through

5 Email automatically sent to end users alerting them of data quality problems

6 End users fix problems identified in error emails

Source: EAB interviews and analysis.

Turn-by-Turn Directions for Corrections

Emails sent to end users for data cleanup in source systems contain all the relevant table and field information needed for users to determine the entries that may require correction.

If data entry staff determine that the flagged entries are in fact correct, even though they violate a coded data quality rule, the staff may mark the entry as an exception so that it does not show up repeatedly in subsequent error reports.

Guidance for Fixing Errors in Source System

Data Quality Summary Email

Data Quality Module	Error Message	Errors	Unique Values	New Errors	Current Semester Data	Exceptions
HR	Age is <14 or >80	5	4	0	5	1
Student Records	Student has duplicate plans	27	13	10	27	0

Exceptions Marking: Staff may identify valid exceptions (e.g., staff member actually is 82 years old) so errors don't constantly repeat.

Line-Item Error Details

Student has duplicate plans

Error Value	Keys	New	Current	Date/Time
ATPH PHD,-----	3000XXXXX~GRAD~2148	Y	Y	12/2/2014 6:51:01 AM

Table Name: PS_ACAD_PLAN

Field with Error: Acad_Plan, Acad_Sub_Plan

Keys in Table: Emplid; Career; Term

Number of Errors: 27

Source: University of Maryland, Baltimore County; EAB interviews and analysis.

Peer Pressure to the Rescue

Interviewees at Wichita State University, which also practices automated error identification, report that peer pressure helps ensure that staff act on error reports.

Every morning an error identification email is sent to data stewards across the university for further dissemination. Data stewards can see the number of errors for their own unit as well as for other units, which drives competition among units to achieve the fewest errors.

Unit-level data stewards have also agreed that their units will correct identified errors within 24 hours of receiving reports. This helps to further ensure compliance.

The result of this process for Wichita State University is that almost 100% of identified errors are corrected in the source system almost immediately. This improves campus members' confidence in institutional data and helps support adoption of data-informed decision making.

Virtuous Cycle of Data Correction Keeps Source Systems Clean

Wichita State University

Compulsory Compliance
Error correction mandated by CDO; agreed upon by unit-level data stewards, who receive and delegate data quality emails

Positive Peer Pressure
Similar offices at the university (e.g., the three admissions offices) compete with each other for lowest error rate

Cleaning House

5-10 DAILY ERRORS
Number of new daily data entry errors per unit; staff typically address errors within one hour

24 HOURS
Length of time after receipt of error reporting email by which university units have committed to rectify errors

100% ERRORS FIXED
Nearly 100% of new admissions and enrollment errors are rectified through this process

Source: EAB interviews and analysis.

Hallmark 8: Unit-Level Data Quality Scorecards

Hallmark in Brief

IT partners with another office, such as internal audit, to create potential unit-level repercussions for poor-quality data. IT creates an escalation process where units that fail to meet stated data quality goals are turned over to the internal audit function for a business process audit.

Problems Addressed

IT has difficulty changing data entry staff members' behavior toward data management due to a lack of formal authority. Data input errors are not tracked longitudinally, so IT staff relies solely upon anecdotal evidence about what areas provide the most ROI for improvements to data quality practices.

Implementation Guidance

Extending Insights About Changing Behavior

EAB research into procurement offices—and their practices for improving adherence to central purchasing policies—offers promising insights for changing campus member behavior toward data management.

Whether buying goods or entering data, people typically value convenience and speed over a sense of compliance. When adherence to institutional policies is inconvenient to units, staff often stick with local practices instead of following the central rules.

Procurement offices struggle with campus members who buy items not included in institutional contracts. Business intelligence staff can learn certain lessons from how procurement offices have changed staff purchasing behavior—targeting communications to staff supervisors and partnering with other offices to create incentives for compliance.

BI Facing an Old Procurement Problem

Procurement Office Lacks Ability to Directly Change Distributed Staff Behavior		Lessons Learned for Data Management
Hierarchy		
Staff **listen to their supervisors, not to central function**, and value local practice over the greater good	→	**Focus the data quality conversation on managers** and end users will follow
Accountability		
Central office **lacks formal authority** to enforce contract compliance policies	→	Partner with other institutional offices (e.g., internal audit) to create **repercussions for poor data quality**
Personal Incentives		
With **no repercussions for policy noncompliance**, staff continue with methods that suit themselves, not what's best for the institution	→	Incorporate data quality guidelines into the **performance reviews** of frontline staff

Source: EAB, "Disciplining University Spend," (2009); EAB interviews and analysis.

Harnessing the Hawthorne Effect

One university's procurement office partnered with the internal audit office to rein in off-contract spending. Internal audit's influence provided the procurement office with formal authority that it had previously lacked.

This partnership enabled procurement to notify internal audit about departments that regularly made off-contract purchases, identified by noncompliance tracking. Once units knew they were being tracked, and there could be negative repercussions for noncompliance, off-contract transactions decreased by over 60% in some units.

IT staff concerned with data quality may be able to leverage what is known as the Hawthorne Effect, where individuals improve or modify their behavior in response to the knowledge that they are being observed. For IT's purposes, invoking the Hawthorne Effect could help change attitudes toward data quality. Tracking data quality over time will also enable IT staff to make a case for workflow or process modifications to improve data quality.

Keeping an Eye on Quality Over Time

HR Scorecard Accuracy Measurements[1]

By Individual Error Messages

		Age Is <14 or >80	Military Status Is Blank	State Is Blank in Home Address
Total Errors This Month		5	21	1
Accuracy Rate	**This Month**	97%	87%	99%
	Last Month	96%	84%	100%
	This Month Last Year	77%	62%	71%
Percentage of Errors Rectified	**This Month**	100%	96%	100%
	Last Month	98%	93%	97%
	This Month Last Year	76%	73%	87%

Longitudinal Tracking

Accuracy rates and error rectification rates over time help managers analyze staff performance.

The Hawthorne Effect

Individuals improve or modify their behavior in response to knowing they are being observed.

1) Illustrative.

Source: EAB interviews and analysis.

Taking Scorecards to the Next Level

People rarely change their behavior unless there is a reward for changing—or a consequence for not doing so. University procurement offices found that the mere threat of an audit was effective at changing campus members' purchasing behavior.

To ensure effectiveness in the data quality realm, a process for data quality audits to occur must be in place. It is possible, however, that outlining the process will be enough to change some units' data management behaviors.

Potential Audit Motivates Data Quality Management

Policy → **Tracking** → **Enforcement**

Unit managers set accuracy and rectification rate goals in coordination with relevant data steward

BI staff review monthly unit-level data quality scorecards for patterns of inaccuracy

Error codes that fail to meet accuracy goals for three straight months will be referred to the internal audit office for review of potential process redesign

The **threat of audit alone** helps increase data input accuracy

HR Scorecard Accuracy Goals[1]

Error Message	Total Errors This Month	Accuracy Rate This Month	Accuracy Rate Last Month	Accuracy Rate Target	Months in a Row Accuracy Rate Target Is Achieved	Accuracy Rate This Month Last Year
Military Status Is Blank	19	87.33%	85.23%	90.00%	-2	89.33%

1) Illustrative

Source: EAB, "Disciplining University Spend," (2009); EAB interviews and analysis.

Cleaning House

Oversight of undergraduate admissions enabled the chief data officer at Wichita State University to institute workflow changes, resulting in higher quality admissions data.

The Wichita State University chief data officer identified opportunities for better yield and reduced recruiting costs if admissions data was of higher quality. He promised these results if one admissions staff member would report to him for a year to help clean up data.

In one year under the CDO's direction, the staff member was able to clean five years of admissions data—40,000 data elements in total. With clean data, the university created recruit-to-applicant probability scores and sent targeted recruitment fliers to prospective students likely to enroll. These practices helped lead to a 27% increase in yield and a 40% reduction in recruitment costs. The university will continue to reap benefits from cleaner data through improved yield outcomes and recruitment costs reductions.

Proving the Value of Clean Data

Source: EAB interviews and analysis.

Hallmark 9: User-Friendly Data Entry Instructions

Hallmark in Brief

Business intelligence leaders create sets of data input instructions to standardize data entry processes across campus. Data entry staff use instructions at the point of data entry, rather than relying on idiosyncratic local practices to inform data input. BI staff prioritize writing new instructions based on the prevalence of errors resulting from nonstandard processes and the importance to the institution of correct data from those areas.

Problems Addressed

Knowledge management failures, caused by lack of documentation, staff turnover, or organizational changes, result in dissimilar data entry practices across an institution. Unit or individual staff create their own rules for data input, and this lack of standardization hampers speed and quality of institutional reporting.

Implementation Guidance

Belmont University

- Institution type: Four-year, private
- Enrollment: 6,900 students (5,500 undergraduates)
- Carnegie classification: Master's university (larger programs)
- Campus setting: Midsized city (Nashville, Tennessee)

Fighting Garbage In, Garbage Out

Data entry staff often focus on efficiency, sometimes at the cost of data accuracy.

The stories at right present cases in which systems were designed without employee workflow in mind. To achieve productivity, staff invent workarounds to get past data entry roadblocks.

Knowledge management for data entry processes often suffers with employee turnover and organizational changes. Staff may come up with local data input practices that conflict with organizational rules because those rules were not communicated formally.

Two Unfortunate Tales

Creative Convenience

Entering Personal Information to Fill a Mandatory Field

- Retail bank system's Social Security Number field was mandatory to progress to next stage of data entry; field would not allow nonsensical entries (e.g., 999-99-9999)
- When customer SSN hard to find, staff would put in their own SSN to enable progression to the next data entry screen

Sales report for unique customers created with logic to identify customers by unique SSN; report inadvertently excludes many unique customers because of data entry problems

Innocent Ignorance

Entering Locally Determined, Nonstandardized Codes

- New university department created; new staff hired
- Staff had no instructions for coding student information, so went with logical instinct
- Staff code non-degree seeking students with "0" whereas other departments code non-degree-seeking students as "NDS"

Enrollment report excluding non-degree seeking students created with logic to exclude fields with NDS; report inadvertently includes all non-degree-seeking students from new department

Source: Kimball R, "An Architecture for Data Quality," Kimball Group (2007); EAB interviews and analysis.

Data Hygiene at Point of Origin

To combat knowledge management failures, Belmont University has created process documents for staff to use during data entry. The documentation sets out clear instructions for data entry in areas that are particularly susceptible to error or inconsistency. BI staff also prioritize document creation according to the importance of the particular data to the university.

The documents define process owners for oversight of related data entry processes across campus. These process owners communicate changes to instructions to relevant data entry staff to ensure continued consistency across campus.

Data entry instruction documents at Belmont University have reduced the amount of staff time spent cleaning poor-quality data and led to faster internal and external reporting (e.g., to IPEDS) and higher campus confidence in institutional data.

Targeting Trouble Spots for Detailed Data Entry Instructions

BELMONT UNIVERSITY

Process Documentation

Citizenship, Permanent Residence and Nonresident Alien Status

Instructions to properly define:

- A U.S. citizen
- A permanent resident
- A refugee or asylee
- A nonresident alien

Defines process owner:

- HR for faculty and staff entries
- International student office for admitted and enrolled students

Step	Action
1	In the Banner form: SPAPERS for students, or PPAIDEN for staff – Tab: Biographical: select a Citizenship Code of 'R' (Permanent Resident)
2	In the form: GOAINTL – Tab Tab: Visa: 1. Select a Visa Type of 'PR' (Permanent Resident) 2. Nation of Issue should be US. 3. You may enter values for any other field on this page. In the form: GOAINTL – Tab: Passport: 1. Enter the Alien Registration Number. This field must have a value. The 9-digit U.S. Citizenship and Immigration Services number listed on the front of Permanent Resident Cards (Form I-551) issued after May 10, 2010, is the same as the Alien Registration Number. The A-number can also be found on the back of these Permanent Resident Cards. Note: If you cannot determine the person's A-number, please enter 99999999 as a temporary value for this field. The field must have a value for the person to be counted properly in IPEDS reporting. 2. You may enter values for any other field on this page. Note: Visa start and end dates are not required for permanent residents, refugees, or asylees.

Source: Belmont University, "Citizenship, Permanent Residence and Nonresident Alien Status in Banner," (2014); EAB interviews and analysis.

Hardwiring Data Access Provision

PART 3

- Hallmark 10: Data Sensitivity Classification Framework
- Hallmark 11: Role-Based Data Access Rights
- Hallmark 12: HRIS Access Rights Coding

A Delicate Balance

Data security and data access present IT staff with a balancing act—arguments abound for having high security as well as having high levels of access. Neither extreme is pleasing to campus members or other relevant audiences, such as a board. Dissatisfaction from users can lead to trouble beyond disgruntled users; if a central system is "too secure," then staff will store data locally, and possibly insecurely.

Hard to Please End Users While Managing Security Risks

The Data Availability Balance

Data Gatekeeper	Totally Open
Low Access	*High Access*
High Security	*Low Security*

"BI is the new data gatekeeper, taking data from units and building new walls around it… it used to be easier for me to get access to data—I would just email the owner. Now there are more rules around data."

Director of Data Analytics, College of Engineering, Public Research University

"We tip the scale at open access… now, because of security concerns everywhere, we're moving into more tightly monitored security. When people leave one position to another they have to reapply for everything, which drives our campus members crazy."

Deputy CIO, Public Research University

Source: EAB interviews and analysis.

Hyper-Reactivity

To achieve some balance between having highly secure data and having open data, institutions typically approve data access on an individual-by-individual basis.

These case-by-case decisions make little sense from a cost perspective or a user satisfaction perspective. Provisioning data permissions is manual and subjective. Further, users suffer long waits as staff respond to high numbers of requests for permission changes.

IT Spending Users' Time Adding Permissions Instead of Adding Value

Key Problems with Case-by-Case Access Determinations

Data Access the New Password Reset

- One FTE may be dedicated to access privilege granting, in an already overworked and understaffed environment

Not Quite Just-in-Time Data Access

- Time to access provision at a typical university: 2-4 weeks
- Loss of productivity while waiting for data access: priceless

Lack of Standards = Lack of Security

- Subjective and inconsistent privilege granting across data stewards

Source: EAB interviews and analysis.

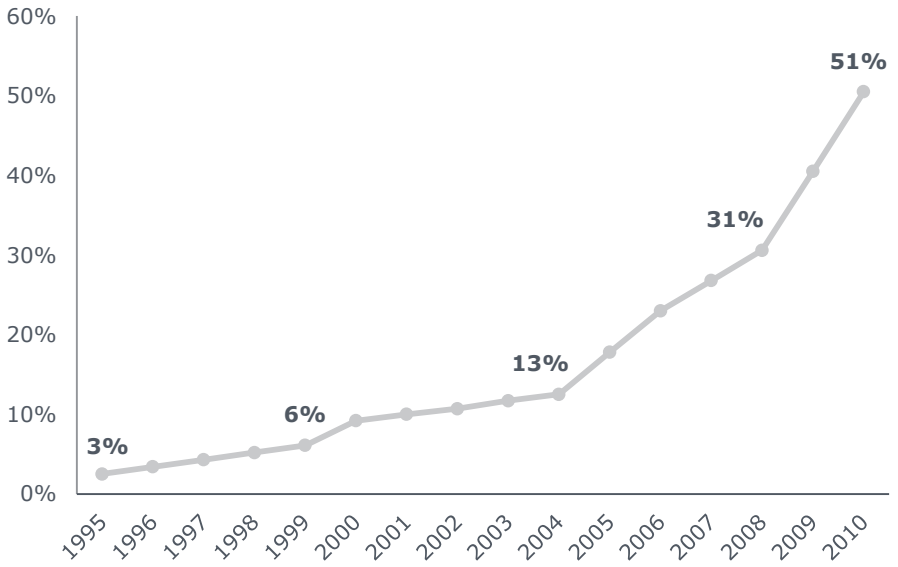
A Commonality in Private Industry

To move beyond the inefficient and insecure practice of case-by-case access determinations, many organizations have moved to role-based data access. Role-based access has become a commonality in private industry in recent years, with high satisfaction among practitioners, but few higher education institutions have implemented wide-spread role-based access processes.

Role-Based Access Skyrocketed in Last Decade

Estimated Role-Based Access Control Penetration Rate

Percentage of Users at Organizations with >500 Employees Having Some of Their Permissions Managed by Role



84%

of organizations agreed that the use of roles has improved efficiency of maintaining the organization's access control policy

Source: O'Connor A and Loomis R, "2010 Economic Analysis of Role-Based Access Control," RTI International (2010); EAB interviews and analysis.

Hallmark 10: Data Sensitivity Classification Framework

Hallmark in Brief

Institution staff identify and segment confidential data across campus systems. Tiered data sensitivity frameworks are created to guide access controls and ensure users access only data appropriate for their needs.

Problems Addressed

Confidential data—including elements subject to privacy regulations—reside throughout numerous campus systems, but there is little tracking or segmentation of data. This stymies institutional efforts to control access to confidential data and presents security and privacy risks.

Implementation Guidance

Where Security and Data Architectures Meet

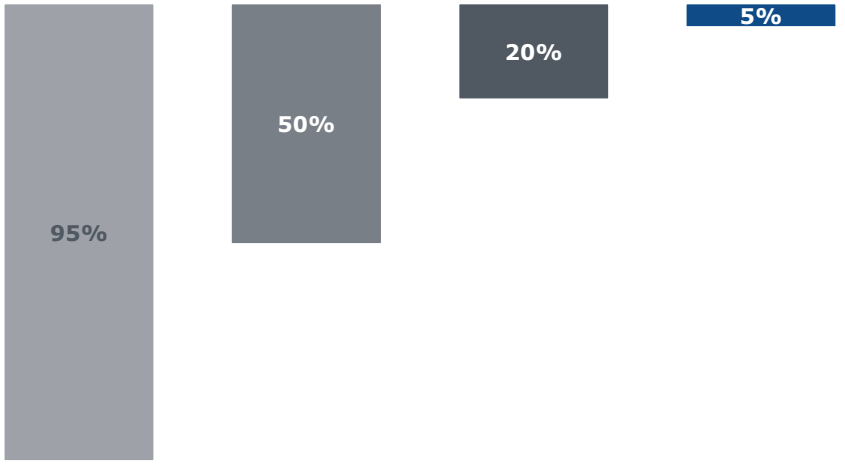
A tiered data sensitivity classification framework helps guide access restrictions to separate confidential data from public data.

While 95% of institutions have managed this basic feat, 5% have not yet accomplished this necessary step towards secure data access. Role-based security, that is, providing access to certain data based on a user's approved profile, also depends upon the existence of a data sensitivity classification framework.

The more that IT knows about the nature of data in its systems, the better it can support safe use of data by campus members.

Identification of Confidential Data a Good Starting Point

It's Ten O'Clock…
Do You Know Where Your Confidential Data Is?



95% of Institutions
Perform at least some segmentation of confidential information; 5% do not.

50% of Institutions
Can identify confidential information at rest.

20% of Institutions
Have segmented information thoroughly across campus systems.

5% of Institutions
Can identify confidential information in transit.

Source: EAB interviews and analysis.

For Your Eyes Only

Many institutions have created three- to five-tier data sensitivity frameworks, such as the example framework at right. Rather than assign a blanket privacy level to all the data from an entire system (e.g., the learning management system or LMS), data governance committees typically assign a sensitivity tier to each term during the definition process. This determination later helps data stewards respond to data access requests and is vital to any automated role-based access scheme.

Data sensitivity frameworks instruct campus members about the standards users must follow to ensure proper storage and protection of non-public data.

Tiered Data Segments Support Variety of Access Levels

Basic Four-Tier Data Sensitivity Framework

Public

Intended for public use
- *Effect of Disclosure*: N/A; data is intended for disclosure
- *Example*: Enrollment figures

Internal

Intended for internal use only
- *Effect of Disclosure*: Minimal or no adverse effect on institutional operations, assets, or reputation
- *Example*: Student ID number

Sensitive

Intended for limited internal use
- *Effect of Disclosure*: Moderately adverse effect on institutional operations, assets, or reputation
- *Example*: Staff date of birth

Restricted

Intended for highly restricted internal use
- *Effect of Disclosure*: Serious adverse effect on institutional operations, assets, or reputation
- *Example*: SSN; data protected by confidentiality agreements

Source: EAB interviews and analysis.

Hallmark 11: Role-Based Data Access Rights

Hallmark in Brief

IT staff control data access through a role-based system that provides secure, timely, and appropriate data access. Data governance committee members determine a bounded set of roles and map each role to access rights for data (e.g., human resources, student, financial, research). Campus members request assignment to a role based on their job duties. An access control system uses role-based access privilege information to create secure data views in reports.

Problems Addressed

Lack of formal data access management necessitates granting access on an individualized, case-by-case basis. Staff in charge of determining access rights spend an inordinate amount of time tracking down information about individuals requesting ad hoc access to data. This leads to subjective, inconsistent permissions and potentially unsecure data access.

Implementation Guidance

University of Washington

- Institution type: Four-year, public
- Enrollment: 43,800 students (29,800 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Seattle, Washington)

"Lightweight" Role-Based Data Access

The University of Washington practices role-based data access through a tiered system with 14 different roles. When developing the set roles, the data governance committee created a permissions guide that maps categories of data elements to roles.

Campus users request data access by submitting a web-based request for inclusion in one or more of the 14 roles. Depending on the role requested, the University's data governance committee or unit-based access management staff review requests.

An internally developed control access system serves as the technical access barrier.

Users may access any central report through the university's BI portal, but they are only able to see columns that their specific roles permit them to view.

.

14 Roles Cover All Potential Data Users

University of Washington's Tiered Role System

Number of Roles:
14

Permissions Guide:
Matrix-based by category of data and data element

Access Request Process:
Individual submission of an access request form

Technical Access Barrier:
Internally developed access control system

Permission Granter:
Data governance committee or unit-based access management service

Reports Viewable per User:
All central reports; secure view happens at the data column level

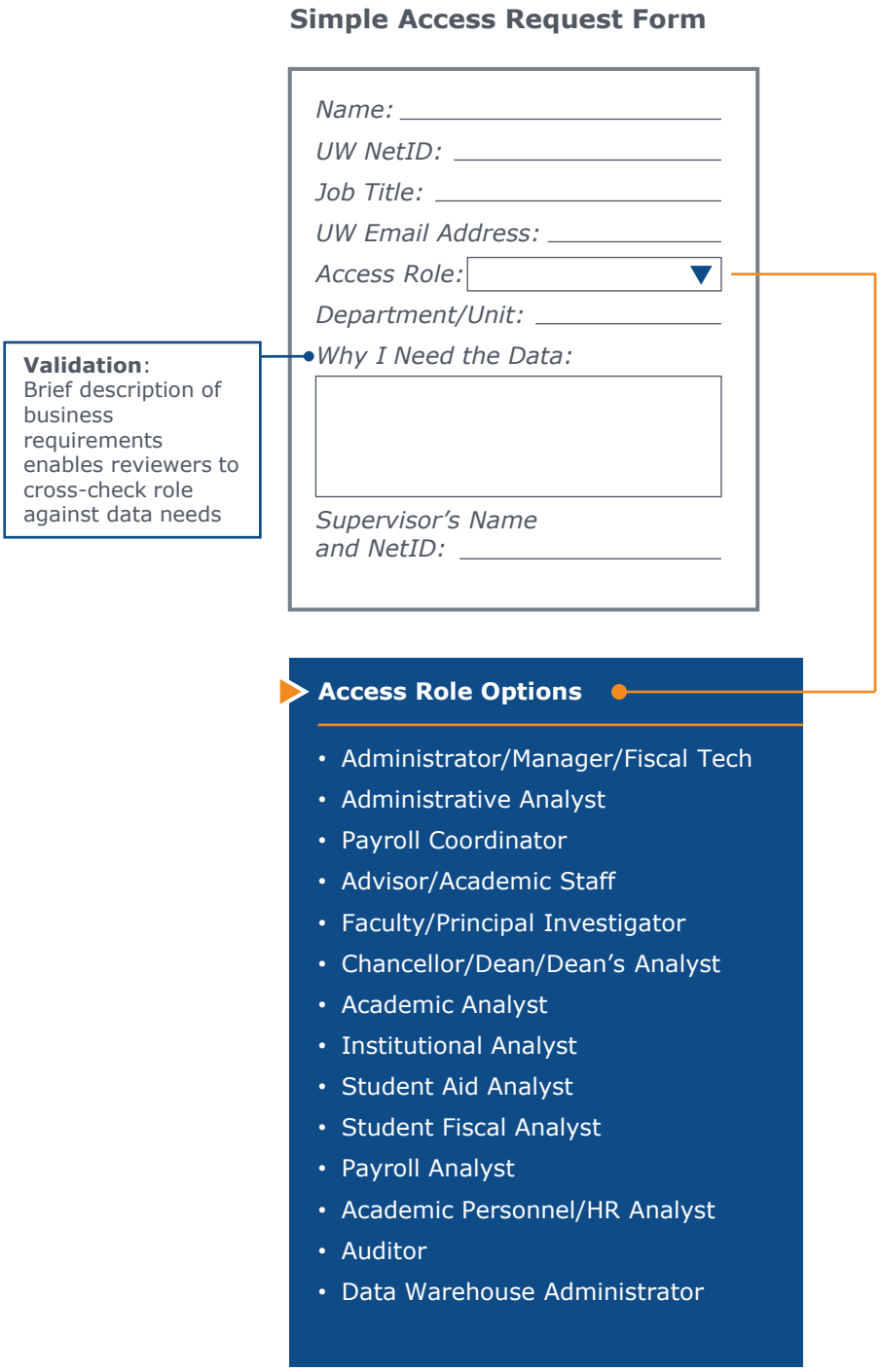
Source: EAB interviews and analysis.

Please, May I Have Some Data?

The University of Washington's online data request form is simple and user-friendly. Users review the data access role options and compare them to their data needs to identify the role most appropriate for their specific data requirements. Users also complete a free text field to provide supplemental information about how they intend to use data to which they would gain access.

If no single role provides sufficient coverage, a user may request multiple access roles.

Making It Easy for Requesters and Permission Granters



Source: University of Washington, "Security Access and Roles Matrix;" EAB interviews and analysis.

Putting the Right Data in the Right Hands

Role-based access at the University of Washington is used for human resources, financial, student, and research data. The data governance committee created a privilege level map for each of these data domains, keying categories of data elements (or individual data elements) to four potential privilege levels—baseline, expanded, high, or full.

The data governance committee then mapped each of the 14 roles to a privilege level for each of the four business domains.

Roles' seniority combined with functional focus help determine the privileges granted. For example, a fiscal technician administrator has only baseline HR privileges, while a payroll analyst has high HR privileges, and an HR analyst has full HR privileges.

Principled Levels of Access Based on Sensitivity

Privilege Level Map[1]

Human Resources Data

Data Element	Baseline	Expanded	High	Full
All HR Data Except the Below	✓	✓	✓	✓
Employment Status		✓	✓	✓
SSN			✓	✓
Citizenship			✓	✓
Date of Birth			✓	✓
Disability				✓
Veteran Status				✓

Role Privilege Matrix

Human Resources Data

Roles	HR Rows (Data Records)	HR Columns (Data Fields)
Administrator/ Manager/Fiscal Tech	All	HR Baseline
Administrative Analyst	All	HR Baseline
Payroll Analyst	All	HR High
Advisor/Academic Staff	None	None
Faculty/Principal Investigator	All	HR Baseline
HR Analyst	All	HR Full
Academic Analyst	All	HR Baseline

1) Checkmark means privilege for read only access to the category of column data in the enterprise data warehouse.

Source: University of Washington, "Security Access and Roles Matrix;" EAB interviews and analysis.

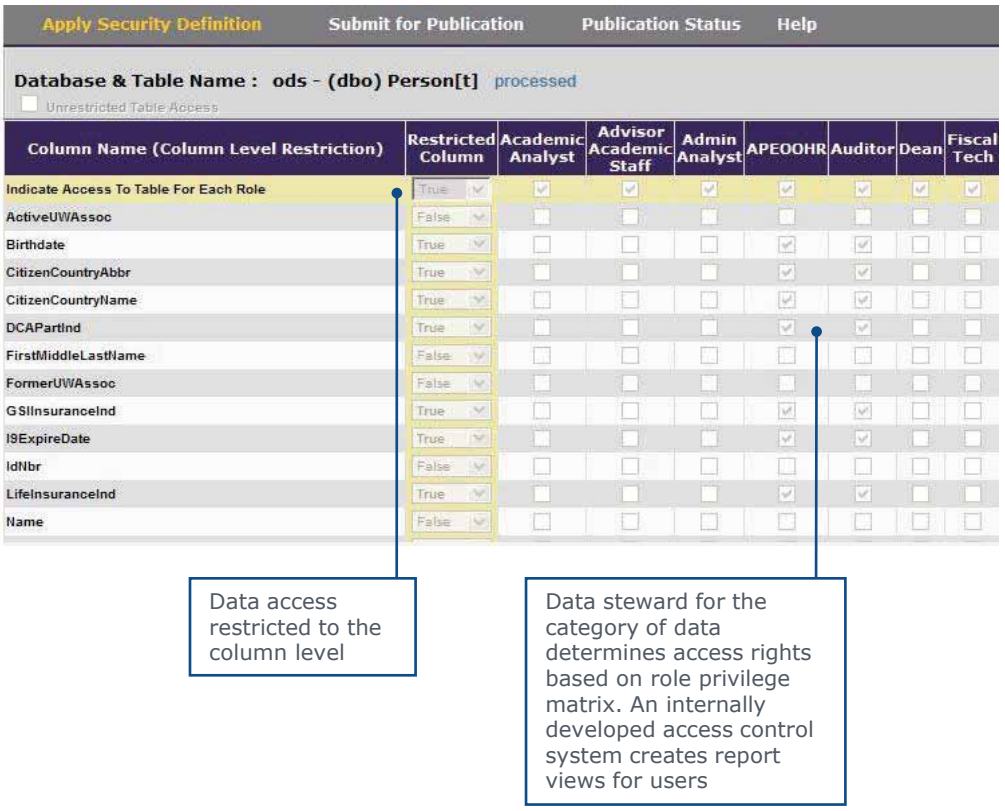
A Look Behind the Curtain

The access levels and corresponding data privileges are brought together in the University of Washington's security administration program. This program enables university data custodians to manage data access as guided by the role privilege matrix.

An internally developed, patent-pending access control system brings together information from the role privilege matrix, security administration tool, and enterprise data warehouse to create role-based data views.

Applying Filters Between Data and User at the Back End

University of Washington's Security Administration Tool



Source: Canfield-Budde A, "DAC'ing and SMAT'ing UW Data," (2013); EAB interviews and analysis.

A Tale of Three Report Views

When a user runs a report, the University of Washington's security administration system checks the platform for each column to determine whether the particular user may view all column-level data or has more restrictive access rights. If the latter is the case, certain columns will be unpopulated in the pulled report.

Users thus have different visibility into native reports based on their assigned access role (and, ultimately, the relevancy of different data to their job duties).

Users May Run Any Report, but Data Included Differs Based on Access

Data Views as Secure as They Need to Be

Native Report

Name	Dept.	SSN	Disability
John Smith	HR	123…	Yes
Jane Doe	Finance	456…	No

Academic Analyst's View

Name	Dept.	SSN	Disability
John Smith	HR	-	-
Jane Doe	Finance	-	-

HR Privileges: Baseline

Payroll Analyst's View

Name	Dept.	SSN	Disability
John Smith	HR	123…	-
Jane Doe	Finance	456…	-

HR Privileges: High

HR Analyst's View

Name	Dept.	SSN	Disability
John Smith	HR	123…	Yes
Jane Doe	Finance	456…	No

HR Privileges: Full

Source: EAB interviews and analysis.

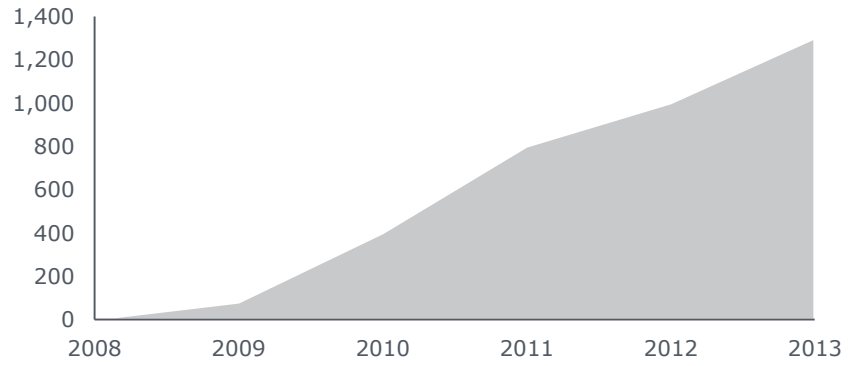
The Counterintuitive Result

With the increased security of a role-based access model, the University of Washington has also increased the number of active report users and the number of reports run.

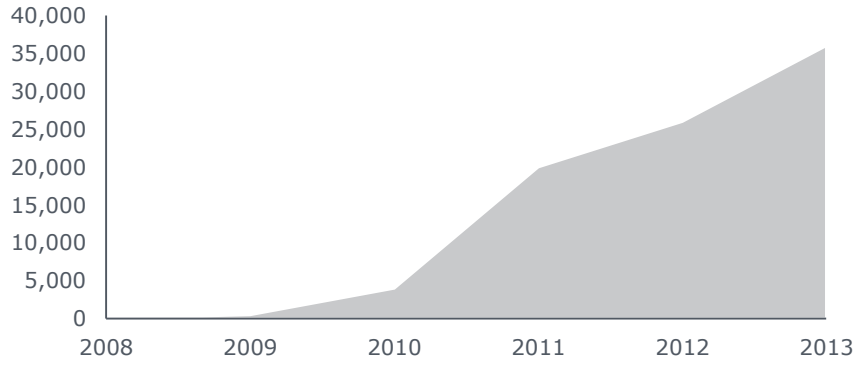
The University's Director of Enterprise Data & Analytics, Anja Canfield-Budde, notes, "The greatest surprise for us was that, by applying more security access controls we are able to provide more and broader access to data faster, which was instrumental in shaping UW's shift to a culture in which decisions are informed by data."

Increased Security, Increased Adoption

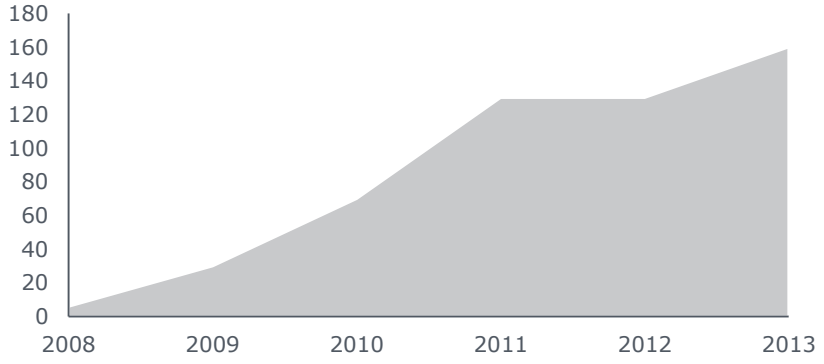
Report Users



Report Runs



Reports Available



Source: Canfield-Budde A, "DAC'ing and SMAT'ing UW Data," (2013); EAB interviews and analysis.

Hallmark 12: HRIS Access Rights Coding

Hallmark in Brief

IT staff create role-based data access by linking standardized human resources position classifications to access rights. IT staff link standardized position classifications to an access guide based on the level of detail within reports as well as the type of data in reports. When the human resources information system updates with employment changes, data access updates automatically.

Problems Addressed

Lack of formal data access management necessitates granting access on an individualized, case-by-case basis. Staff in charge of determining access rights spend an inordinate amount of time tracking down information about individuals requesting ad hoc access to data. This leads to subjective, inconsistent permissions and potentially unsecure data access.

Implementation Guidance

Oregon State University

- Institution type: Four-year, public
- Enrollment: 27,900 (23,200 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Small city (Corvallis, Oregon)

Position Classification-Based Data Access

Oregon State University practices role-based data access with a complete coverage model rather than a tiered-role model.

By linking standardized HR position classification to access rights, the BI team at Oregon State has enabled all campus staff and administrators to maintain access to data relevant to their roles without requesting permission.

The university's human resource information system (HRIS), combined with a central authentication service (CAS), determines the level of data that users may view.

Data Needs Mapped to 650 Positions

Oregon State University's Complete Coverage System

Number of Roles:
~650

Permissions Guide:
Matrix-based by category of data and report data detail level

Access Request Process:
Automatic based on standardized HR position classifications

Technical Access Barrier:
Central Authentication Service (CAS)

Permission Granter:
N/A (automatically done)

Reports Viewable per User:
Select reports; secure view happens at the column level

Source: EAB interviews and analysis.

Principle of Least Privilege

The BI team at Oregon State University leverages the principle of least privilege (i.e., users may access only the data essential to their work) to determine access levels by the level of detail of data and the type of data in each report.

The BI team classifies data at increasing levels of aggregation—aggregate data is widely available, semi-aggregated data is available to fewer users, and detailed data is available to even fewer users who require access to the data for their jobs, and therefore have more privileges.

How Far Should Users Be Able to Zoom In?

Report Access Matrix

Report Data Aggregation Levels

1. **Aggregate Summary**: High-level aggregation (e.g., student credit hours by school, expense reports by organizational code)
2. **Transaction Summary**: Medium-level aggregation (e.g., average GPA by major, expense reports by account code)
3. **Transaction Summary**: Medium-level aggregation with subsets of sensitive data (e.g., class rosters, payroll transactions)
4. **Transaction Level**: Detailed information (e.g., student registration, drill-down to expense transactions)
5. **Sensitive Data**: Detailed information (e.g., student profile information)

Source: Oregon State University, "Report Matrix;" EAB interviews and analysis.

Identifying the Need-to-Know Positions

After standardizing faculty, classified, and unclassified positions in the human resources information system (HRIS), the BI team at Oregon State University mapped the 650 roles to a security level for finance, human resources, and student data.

Each of the 650 positions took roughly one hour to map, with faculty and executive positions requiring the least review time. The student data security level was the most difficult to determine for each role; this process took about 75% of the total review time required for the mapping.

Principled Levels of Access Based on Detail of Data in Reports

Three Decisions Made per Role

Security Level

Role	Finance	HR	Student
Trades/ Maintenance Coordinator	1	1	1
Coordinator-Student Program	2	2	3
Accountant 2	4	3	1
Buyer 2	4	1	1
Executive 3-Dean	4	3	5

Rationale: Requires student schedule and program participation information and expense reviews

Rationale: Requires only detailed finance information to perform job duties

Source: EAB interviews and analysis.

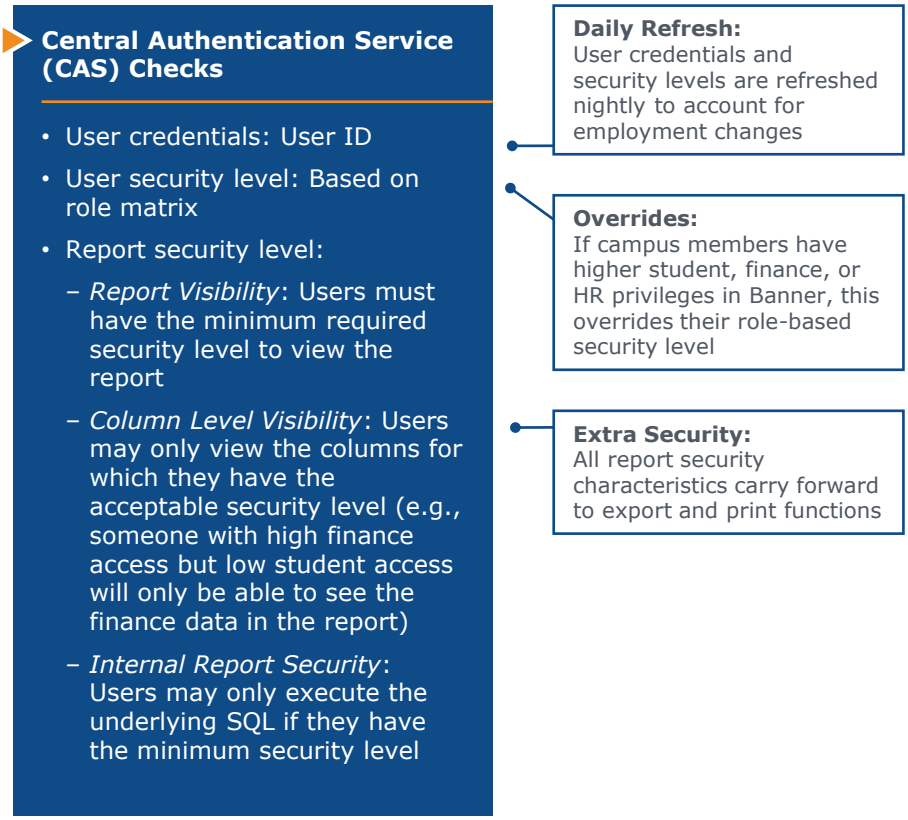
Marrying Access Rights with Report Visibility

At the time of report execution, Oregon State University's central authentication service (CAS) checks users' credentials and the security level matrix. The human resources information system (HRIS) updates roles daily to ensure continued appropriate access.

If a user runs a report that includes no columns that user has permission to access, the report will not be able to be viewed. If the user does have appropriate access to view the report, the CAS will show only those columns that the user is permitted to view.

To avoid as many manual access rights changes as possible, IT staff programmed the CAS so that higher Banner® privileges granted to an individual override the person's role-based privileges.

Authentications Checked at Time of Report Execution



Source: EAB interviews and analysis.

Freeing the Data

Timeliness of data access is now a non-issue for all Oregon State University campus members.

There are an average of 250 qualifying employment changes (i.e., new hires, job changes, and terminations) per month at the University. Absent a role-based system, an IT staff member would need to annually adjust, add, or remove access to data for each employment change. Instead of the three-week wait period for data access that had been the norm for employment changes in the past, user access now automatically changes overnight, as HRIS updates trigger immediate data privilege changes.

This automatic process also eliminates the need for two FTE to handle access provisioning at the University.

All Campus Members in HRIS Granted Proper Access—Automatically

No Waiting…

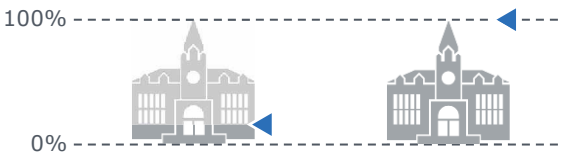
21 days **before** role-based access

0 days **after** role-based access

…And Almost Instant Changes

	Case-By-Case Method	Role-Based Method
New Hire	4-6 weeks	1 day
Job Change	2-4 weeks	1 day
Termination	2-4 weeks	1 day

Full Coverage…



12% of staff **before** role-based access

100% of staff **after** role-based access

…At a Lighter Lift for Access to All

	Case-By-Case Method	Role-Based Method
Initial Staff Hours	6,500 Hours	650 Hours
FTE for Maintenance	2 FTE	0 FTE

Source: EAB interviews and analysis.

Maximizing Report Relevance

PART 4

- Hallmark 13: BI Merchandising
- Hallmark 14: Personalized Recommendation Engine
- Hallmark 15: Demand-Driven Report Enhancement
- Hallmark 16: Unit-Level BI Road Maps
- Hallmark 17: Crowdsourced Innovation
- Hallmark 18: Low-Cost Bridge Workarounds

Toward Data-Driven Decision Management

Data-driven decision making typically outperforms intuition- or gut-based decision making.

In 2011, researchers from the Massachusetts Institute of Technology and the University of Pennsylvania conducted a study that found a positive correlation between a firm's culture of data-driven decision making and firm performance. The study created a data-driven decision making composite score based on a survey of human resources managers and CIOs' level of agreement to: We (1) Use data for the creation of a new service and/or product; (2) Have the data we need to make decisions in the entire company; and (3) Depend on data to support our decision making.

Desiring increased performance, many organizations have restructured their operations to embed analytics into employee workflows. Leaders at organizations from zoos to hospitals now push relevant data to staff to help inform their decisions.

The Performance Dividend for Data Consumers

Cultures of Data-Driven Decision Making Paying Off

MIT Sloan Management

Study found that companies that adopt data-driven decision making **increase output and productivity by 5% to 6%** over those that do not.

Analytics Becoming Embedded in Users' Workflows

Call center agent recommends an upsell based on analytics report informed by customer's on-the-call behavior

Sensors on airplanes and commercial trucks that record performance data identify when the vehicles need repair and communicate this with maintenance staff

Embedding analytics in workflows makes data:

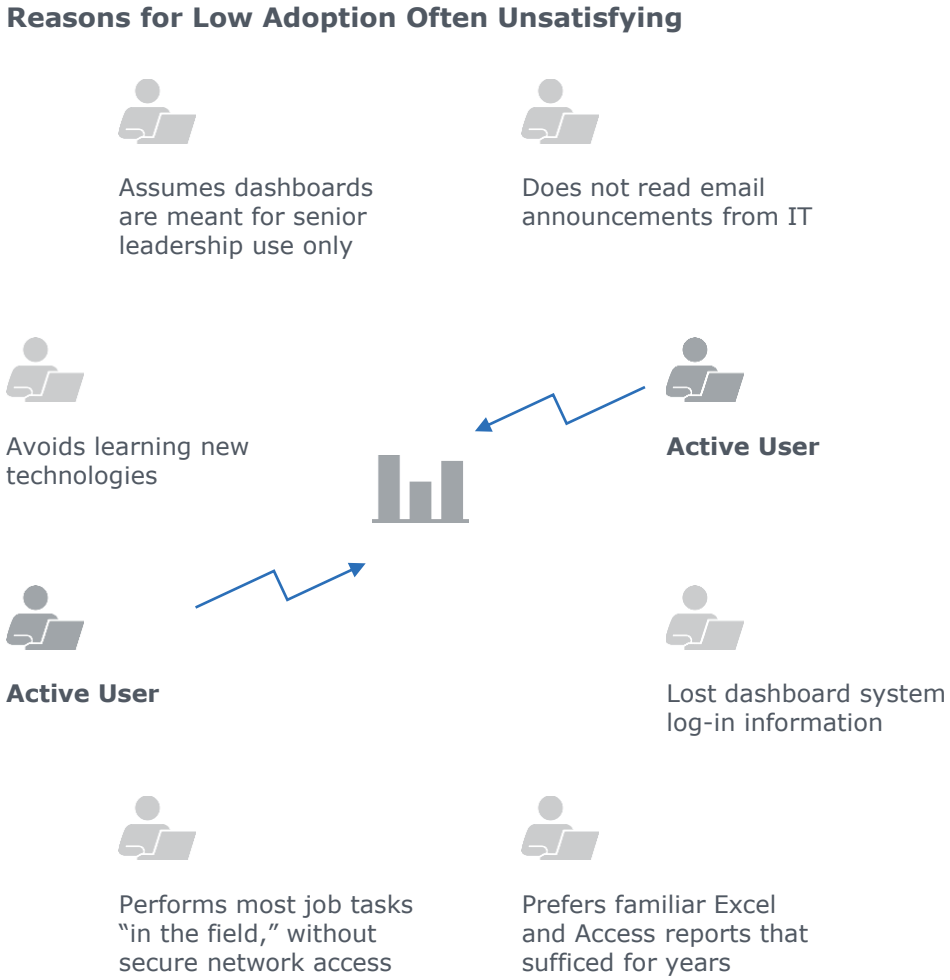
- Easier to consume
- Easier to act on
- More valuable to the institution

Source: Brynjolfsson E, Hitt L, and Hellen Kim H, "Strength in Numbers: How Does Data-Driven Decisionmaking Affect Firm Performance?" (2011); Fern Halper, "Embedding Advanced Analytics," The Data Warehousing Institute (2014); EAB interviews and analysis.

Build It and They Won't Come

Even after making massive investments in business intelligence initiatives, institutions often struggle to drive usage across campus. A multitude of obstacles can lead a potential user to resist the use of available analytical resources: everything from losing a password to ignoring technology-related emails. BI staff must labor to ensure that reports are as easy to use and relevant as possible to encourage user adoption.

Even After Analytics Investments, Institutions Suffer from Low Adoption



Source: EAB interviews and analysis.

Reports Run Wild

To satisfy diverse institution members' needs, many analysts create ad hoc reports to answer one-off questions. This results in a rampant proliferation of reports, which can strain IT support, increase the difficulty of communicating data updates to campus members, and make opaque the effort campus members put into creating reports.

One private master's institution found that many campus members would obtain central reports then make minor modifications. Others would acquire these new reports and further adapt them. This culture of modifications led to redundancy in the underlying data as well, due to report builders creating new data blocks which were often duplicative.

Individual Users' Evolving Requirements Cause Rampant Duplication of Reports

Endless Report Duplication Process

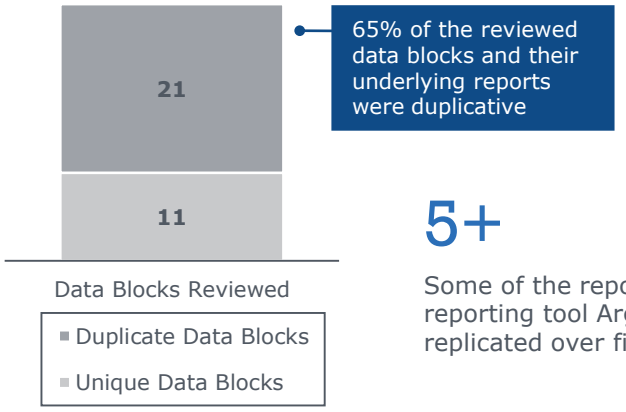
BI team creates the report "Current Student Data by Term"

User needs campus emails in report as well, creates new report of "Current Student Data by Term with Campus Email"

Another user needs personal emails in report as well, creates new report of "Current Student Data by Term with Personal Email"

Duplicative Student Data Blocks Causes Inefficiencies

Data Audit Results from a Private Master's University



5+

Some of the reports in the reporting tool Argos have been replicated over five times

- Inefficient report creation
- Long list of reports to scroll through
- Increased maintenance burden on IT

Source: EAB interviews and analysis.

Hallmark 13: BI Merchandising

Hallmark in Brief

BI teams promote user consumption of reports by providing narrative insights, appealing formats, and mobile access to data. BI staff collaborate with functional units to create reports with narrative context about the data within reports. Two strategies for this method include (1) simple one-page documents with stories about profiled data, and (2) restructuring the BI portal to resemble an online newspaper. BI teams also optimize reports for mobile devices to encourage on-the-go data consumption.

Problems Addressed

BI reports are typically static and provide little to no context or narrative about insights that can be derived from the data. Such reports fail to engage campus members or attract typical non-consumers of data. This leads to low adoption of reports and BI tools as well as user confusion and frustration. In addition, lack of mobile access to or portability of data leads to delayed data provisioning and unsustainable ad hoc requests directed to the BI team.

Implementation Guidance

University of Arizona

- Institution type: Four-year, public
- Enrollment: 40,600 students (31,700 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Tucson, Arizona)

Umeå University

- Institution type: Four-year, public
- Enrollment: 32,500 students
- Classification: Comprehensive university
- Campus setting: Midsized city (Umeå, Sweden)

University of Texas System

- Institution type: Public state system
- Enrollment: 213,000 students

Cobwebs Distressingly Prevalent

End user confusion or frustration with reporting and BI tools often leads to low adoption. Typical data displays fail to provide much context about the data, leaving individuals to try to identify what is pertinent or interesting about the data. Further, many BI tools require technical skills for installation or analysis, which many campus members lack.

These barriers may cause campus members who would be ideal BI users—those trying to track unit performance, identify areas of inefficiency, or evaluate trade-offs for different decisions—to use only their intuition for decision making.

Tools, Reports Go Unused as Consumers Can't Figure Out What Matters

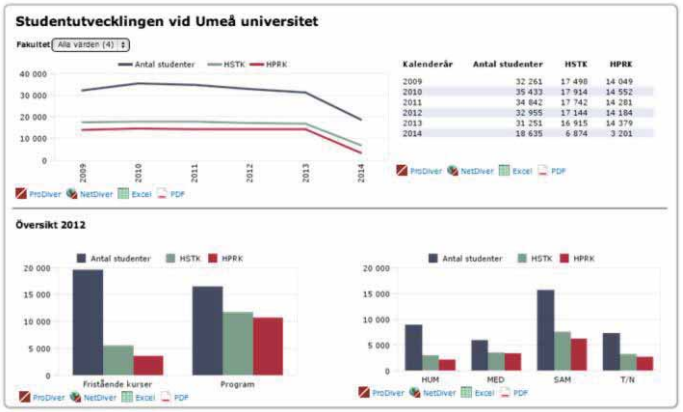
Users Often Struggle to Find the Value in Data

"What should I be looking at?"

"What matters right now?"

"Why is this data important to me?"

Umeå University BI Subpage (Early 2014)



BI tool was difficult to install, requiring strong technical skills

After installation, few campus members used the BI tool

Source: Umeå University, "BI as a Newspaper" (2014); EAB interviews and analysis.

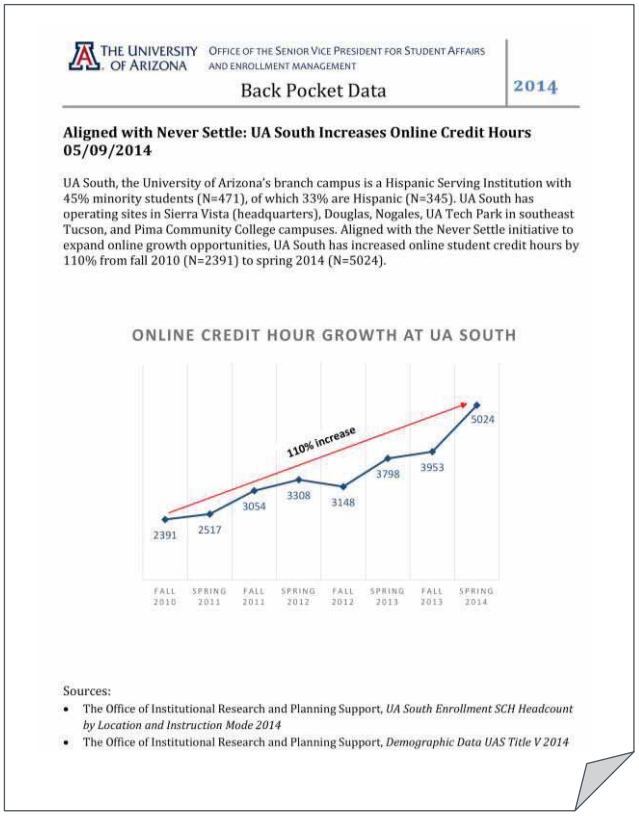
Skating to Where the Puck Will Be

To increase the relevance and usefulness of data to campus, the office of Student Affairs and Enrollment Management's assessment team at the University of Arizona created a series of one-page documents that profile data from the office's units. These biweekly "Back Pocket Data" emails each tell a story through both narrative and visual display of data, ensuring that relevant insights are communicated.

Functional units submit ideas for stories on a quarterly basis, typically during slow times for the individual units. The assessment team selects topics based on timeliness, newsworthiness, and quality of data. For each chosen topic, the submitting unit and the assessment team meet to discuss messaging and graphics for the feature.

The final product emails raise awareness of data-driven insights and inform the decision making of executive leadership and functional directors. Additionally, the emails have helped increase overall data quality in Arizona's Office of Student Affairs and Enrollment Management, as staff have competed for their units to be profiled, knowing that quality of data is one factor the assessment team uses in choosing stories.

Pushing Insights That Connect to Workflow



THE UNIVERSITY OF ARIZONA | OFFICE OF THE SENIOR VICE PRESIDENT FOR STUDENT AFFAIRS AND ENROLLMENT MANAGEMENT

Back Pocket Data | 2014

Aligned with Never Settle: UA South Increases Online Credit Hours
05/09/2014

UA South, the University of Arizona's branch campus is a Hispanic Serving Institution with 45% minority students (N=471), of which 33% are Hispanic (N=345). UA South has operating sites in Sierra Vista (headquarters), Douglas, Nogales, UA Tech Park in southeast Tucson, and Pima Community College campuses. Aligned with the Never Settle initiative to expand online growth opportunities, UA South has increased online student credit hours by 110% from fall 2010 (N=2391) to spring 2014 (N=5024).

ONLINE CREDIT HOUR GROWTH AT UA SOUTH

Sources:
- The Office of Institutional Research and Planning Support, *UA South Enrollment SCH Headcount by Location and Instruction Mode 2014*
- The Office of Institutional Research and Planning Support, *Demographic Data UAS Title V 2014*

- Created by Student Affairs and Enrollment Management assessment team
- Topics dictated by relevant current events and best available data
- Sent every two weeks to over 200 university executives and directors
- Requires one-half to one day to create depending on initial availability of data

Unexpected Gains

"The benefits were far beyond what we ever expected… It raised the quality of reporting across all divisions, not only for [this], but for all other reporting."

Angela Baldasare, Assistant Provost for IR, University of Arizona

Source: University of Arizona, "Back Pocket Data" (2014); EAB interviews and analysis.

Everything You Want to Click (Except Cat Videos)

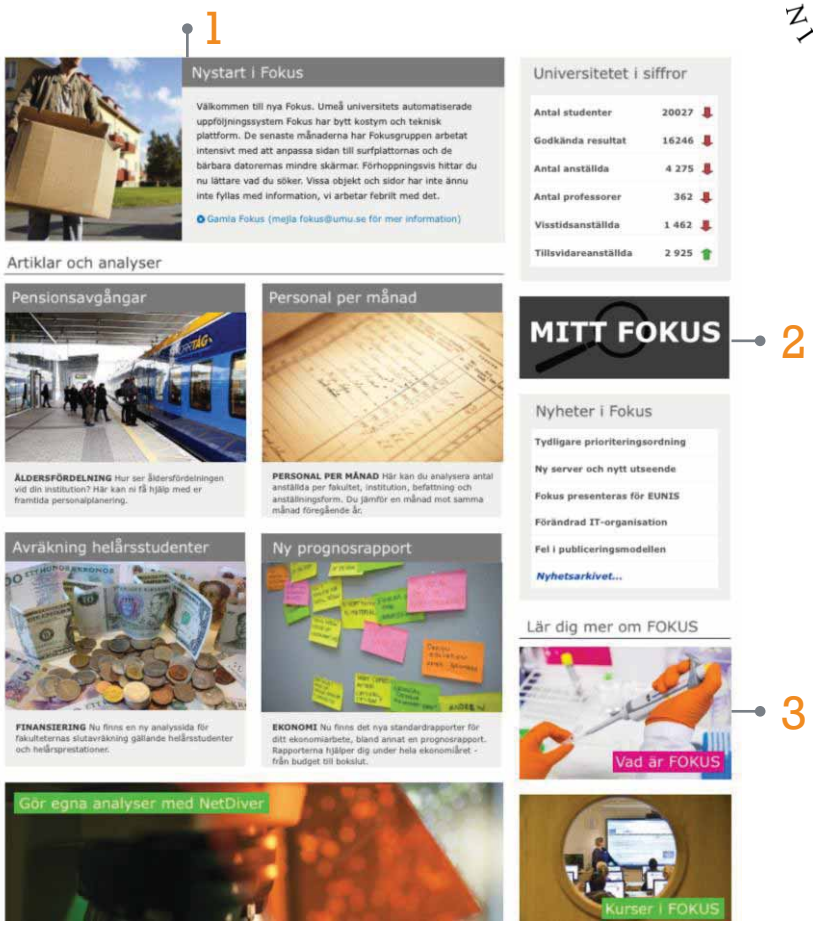
Umeå University in Sweden has taken context provision to an additional level, changing the formatting of their BI tool's portal to look more like the BBC or *New York Times* websites.

This new eye-catching format directs users to the articles (i.e., reports) that may be the most interesting or relevant at any given time. For example, in the fall, the portal highlights reports about the university's performance against its enrollment goals.

The needs of more advanced data users are accommodated by the website as well. Users wishing to access ad hoc reporting capabilities may do so through the website, which is also optimized for tablets and mobile devices.

Appealing News Format Engages Non-consumers

Newspaper-Like Home Page Design for BI Reports



1 **Relevance:** BI team pushes most important data stories to campus members through the home page

2 **Drill-Down:** Self-service BI accessible through the portal

3 **Eye-Catching:** Newspaper-like format attractive to data non-consumers; images taken from university's preexisting image database

Website optimized for tablets and laptops to encourage frequent use

Source: Umeå University, "BI as a Newspaper" (2014); EAB interviews and analysis.

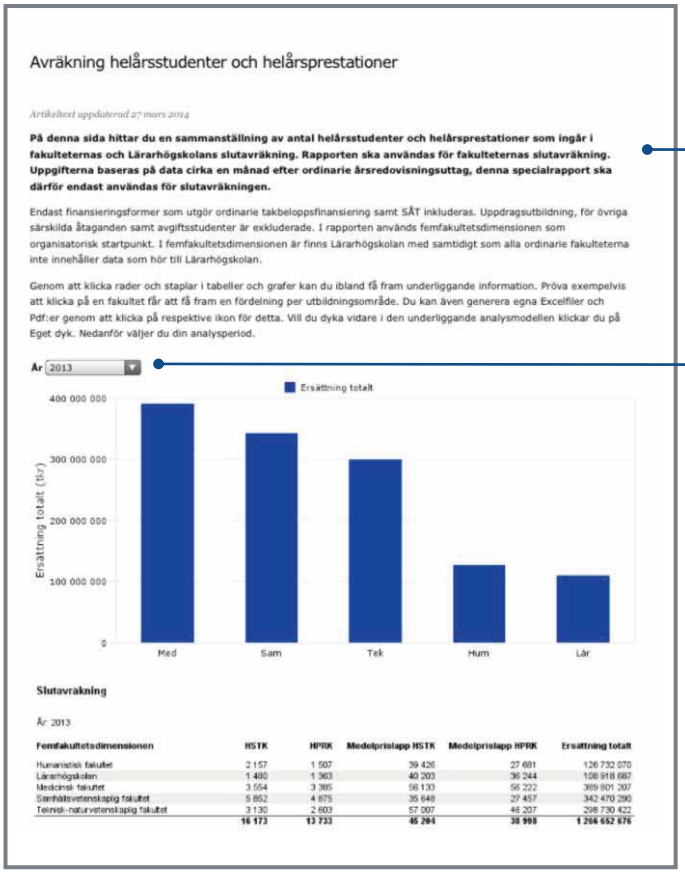
Click-Through to Analysis and Context

What differentiates the articles on Umeå University's BI website from most institutions' reports is the dynamic nature of the articles. Two BI staff members write narrative text for each article, refreshing commentary monthly to ensure the context continues to match the underlying data.

Though context is updated monthly, the source data automatically updates daily. The website allows end users to drill down into the data within each article for further exploration, providing transparency and promoting deeper understanding of the underlying data.

Regular Updates Keep Content Fresh

Articles Encourage Repeat Views



Two BI analysts update descriptive text monthly

Source data updated daily; dynamic drill-down capabilities enabled

Periodic reuse of analyses (e.g., enrollment articles each semester) increases team efficiency over time and allows for trend analysis.

Articles requested by executive management that may be of general interest are posted for all to see, reducing redundant requests.

Source: Umeå University, "BI as a Newspaper" (2014); EAB interviews and analysis.

Bigger Bang for Your Krona

Presenting data in an engaging format helped the Umeå University BI team increase adoption among typical non-consumers of university data. User satisfaction has increased dramatically, and campus adoption has tripled.

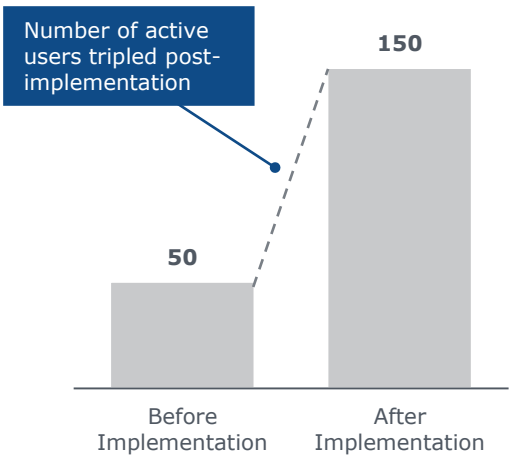
To drive users to the website and encourage BI adoption, the BI team posts requested reports on the portal, directing users there rather than sending individual reports as attachments.

The web-based portal's ease of use has also helped cut down on time spent on user support by BI staff members. Previously, BI staff spent 20% of their time helping with BI tool installation and support; after implementation of the new portal, support time was cut in half.

Consumer-Friendly Interface Introducing BI to New Audiences

User Adoption Increases…

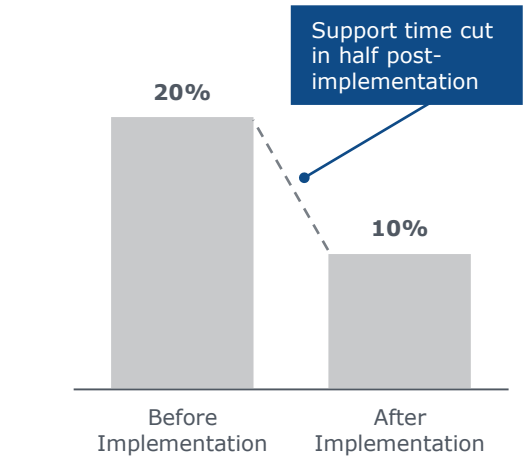
Number of Active Users per Month



Campus members find the interface more appealing and data easier to understand

…While Support Time Decreases

Time Spent on BI Support Issues



More time spent on development, less on ad-hoc reporting and service support

Source: Umeå University, "BI as a Newspaper" (2014); EAB interviews and analysis.

One Order of BI – To Go

With enterprise use of analytics a high institutional priority for many, it's no surprise that CIOs are looking to increase the number of avenues for campus members to access data, including enabling mobile access.

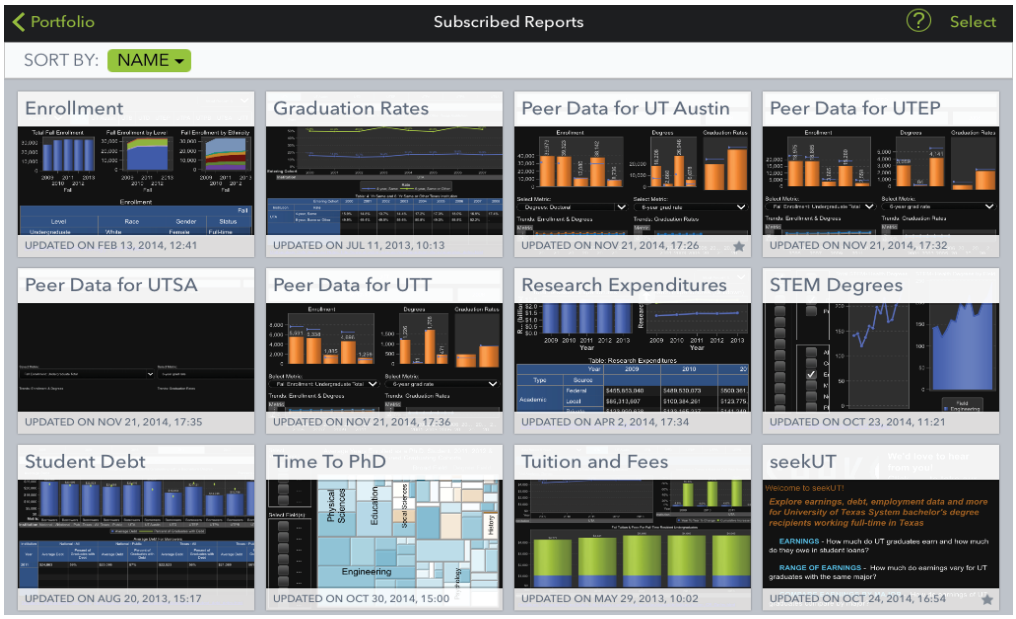
The Office of Strategic Initiatives at the University of Texas System has adopted a mobile platform that can be accessed via tablet computer through an app. Drill-down capable reports can be downloaded and later accessed without an internet connection, providing truly on-the-go data access.

This mobile platform came into being after the Office of Strategic Initiatives realized it was struggling to keep up with data demands from the system's regents, and that data-driven discussions in meetings often outpaced staff capabilities to provide data.

While a lack of data used to be a common obstacle that prevented productive discussion in meetings, it is now a thing of the past. Regents and other system staff can now carry data with them and look up reports independently, which has lowered the number of ad hoc requests received by the Office of Strategic Initiatives.

The Future of End-User Enablement

The University of Texas System's Mobile Platform



Sample Reports Available from the SAS Mobile BI App

- Tuition and Fees
- Enrollment
- Graduation Rates
- Research Expenditures
- SeekUT: *For prospective students and their families*

- Single source of truth accessible by all and anywhere via tablet computer
- All reports can be downloaded and accessed offline
- Reports provide drill-down capabilities, cut down number of data requests

Source: University of Texas System, "Download the SAS BI Mobile Application from the Apple App Store on Your iPad;" EAB interviews and analysis.

Hallmark 14: Personalized Recommendation Engine

Hallmark in Brief

BI users are guided to reports they may find helpful for their particular role and information needs. A feature within the BI portal recommends reports to end users based on similar data elements in reports those users have viewed and reports that campus members in similar roles have viewed. Campus members also provide comments on how they use individual reports to inform decisions.

Problems Addressed

End users typically view a narrow range of reports and are unsure what other reports may be applicable to their work. Users also struggle to formulate questions to ask of data to identify additional insights.

Implementation Guidance

University of Washington

- Institution type: Four-year, public
- Enrollment: 43,800 students (29,800 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Seattle, Washington)

A Virtual BI User Group

Most institutions rely on end users to determine for themselves which reports are relevant to their work. The University of Washington goes beyond this by leveraging two types of inputs to tailor report recommendations to users, similar to online shopping experiences and service provider reviews.

These twin resources help combat the disconnect problem that can occur when BI report writers believe they have created resources that will answer users' questions, but end users in fact remain confused about how to get value from BI resources.

Referral Services for Decision Support

The Data Intelligence Mismatch

BI Team Member

"These reports are great, they should be able to answer so many campus members' questions!"

Report User

"I never know what reports might be useful to me, or what questions I could even ask of the data."

Two Inputs to Improve Users' Experiences

Recommended Reports Function

Uses simple predictive algorithms to identify applicable reports for users based on like data elements in reports and similarity of usage patterns by users' roles.

Report Usage Feedback

Yelp-style posts by campus members about how they use reports.

Source: EAB interviews and analysis.

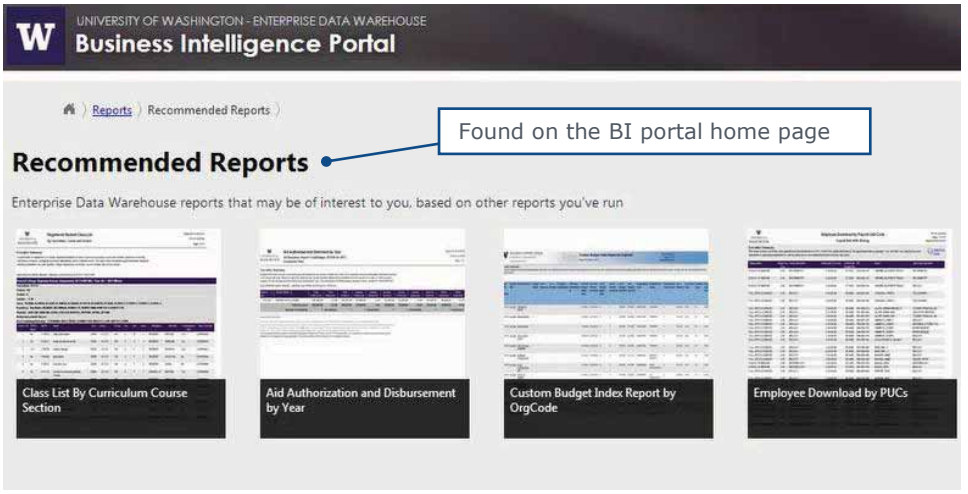
What You (Uniquely) Might Be Interested In

One way to direct users to useful reports is to recommend reports to them based on the users' own actions. These recommended reports can be found on the University of Washington's BI portal and are tailored to individual users.

This function surfaces potentially useful reports that users may have forgotten or never known about. The algorithm behind the recommendation function draws from reports that the user has viewed. The algorithm compares this to the reports viewed by campus members in similar roles in order to generate recommendations for additional reports. For example, a budget coordinator within the College of Arts and Sciences will receive suggestions based on the reports that have been viewed by other budget coordinators across campus.

Reports Recommended by the User's Actions and Role

Algorithm identifies and recommends reports that the user has never run (or hasn't run recently) based on other reports the user frequently views as well as reports that other campus members in a similar role frequently view



Example reports recommended to user:

- Class List by Curriculum Course Section
- Aid Authorization and Disbursement by Year
- Custom Budget Index Report by Org Code
- Employee Download by PUCs
- Current Online Check Register

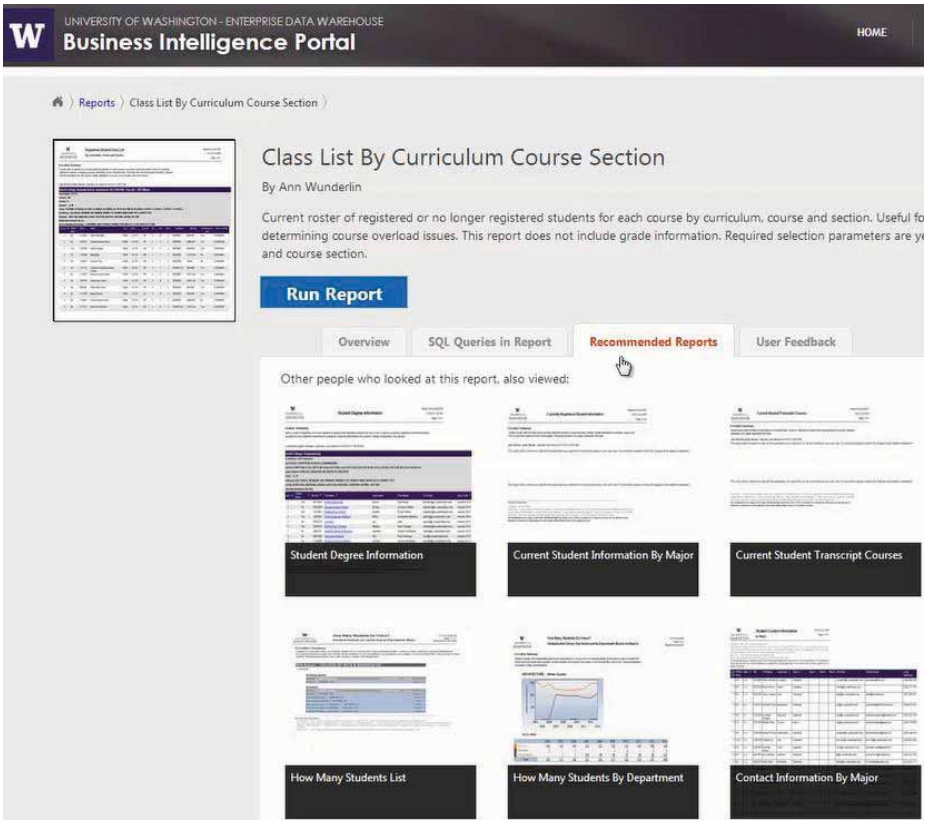
Source: University of Washington, Business Intelligence Portal Guided Tour; EAB interviews and analysis.

Users Who Viewed This Report Also Viewed…

The second way the University of Washington BI portal helps guide users to relevant reports is to provide recommendations within individual reports. The algorithm for this function identifies the additional reports viewed most commonly by users who have viewed the present report.

Washington's recommendation functionalities have helped increase visibility across campus for the different central reports within the BI portal. Adoption has also increased as users have become more familiar with the available reports, and the BI team has received positive feedback from campus members about these features.

Reports Recommended by Other Users' Actions



Other people who viewed the "Class List By Curriculum Course Section" report also viewed these reports:

- Student Degree Information
- Current Student Information by Major
- Current Student Transcript Courses
- Time Schedule Information
- How Many Students List
- How Many Students by Department
- Contact Information by Major
- Student Transcript Detail

Source: University of Washington, Business Intelligence Portal Guided Tour; EAB interviews and analysis.

Crowdsourcing Report User Feedback

Even users who are viewing the correct reports for their needs often struggle to identify how to use the report well. The University of Washington thus pairs the recommended reports features with user feedback to create a virtual BI user group.

Within each individual report, users can post comments about how they use the report, helping others crowdsource potential opportunities for report usage.

This feature also provides a boon to BI teams, who can utilize the crowdsourced information to inform future report development.

Answering the Question, "What Can I Even Do with This?"

Example User Feedback for the Report "Class List By Curriculum Course Section"

IT Help Desk Technician, School of Business

How I Use It: I work with Blackboard and Canvas and need to be able to look up enrollments in a class. When students have trouble accessing a Blackboard or Canvas course, I use this report to verify that they do indeed have the correct course.

Undergraduate Advisor, Environmental and Forest Studies

How I Use It: Which students need to be notified if we are dropping, moving, or changing a class? What are the email addresses for all students enrolled in a specific course?

Program Assistant, Electrical Engineering

How I Use It: Which students are enrolled in particular courses? Which students are enrolled in research credits? How many non-majors are enrolled in departmental courses? What is the class standing distribution of students in a particular course?

Source: University of Washington, Business Intelligence Portal Guided Tour; EAB interviews and analysis.

Hallmark 15: Demand-Driven Report Enhancement

Hallmark in Brief

An adoption rate monitoring system helps pinpoint BI usage patterns by department and role, reconcile competing analytics reports, and identify power users who could serve as sounding boards for new ideas on dashboard functions and features.

Problems Addressed

Users' reasons for underutilizing BI resources vary widely, ranging from password loss to preferred shadow systems, complicating adoption strategies. University technology officers struggle or fail to pinpoint usage patterns, leading to one-size-fits-all approaches to driving adoption of expensive BI tools.

Implementation Guidance

Arizona State University

- Institution type: Four-year, public
- Enrollment: 48,700 (38,700 undergraduates)
- Carnegie classification: Research University (very high research activity)
- Campus setting: Midsized city (Tempe, Arizona)

A Dashboard of Dashboards

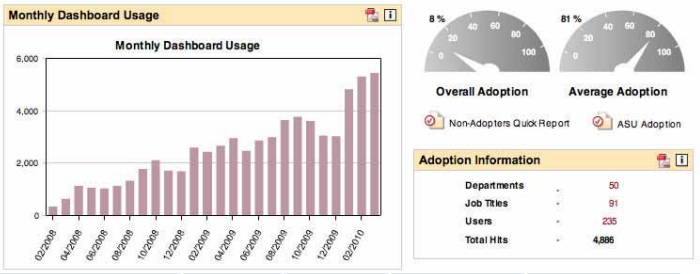
After deploying functional dashboards across campus, Arizona State University invested in developing an adoption rate monitoring system.

The master dashboard provides the University Technology Office with information about who is using specific dashboards, what parts of the system are most often used, and how frequently dashboards are accessed.

Meta-Analysis of Dashboard Activity Refines Delivery Strategy

Sample Dashboard Utilization Report

IT Support Dashboard



Department	Users	Dept. Head Count	Adoption Rate	Hit Frequency
Finance	24	24	100.0%	312
Facilities	26	98	27.4%	41
Provost	11	12	91.7%	430
Parking	2	15	13.3%	12
Student Affairs	65	70	92.9%	117
Admissions	35	35	100.0%	514

Clicking on the title of a particular department pulls up user-level usage statistics, allowing ASU to see Role-Specific Adoption Rates and Hit Frequencies.

Department Adoption Rate: Shows the percentage of potential departmental users who are using the dashboards at all, regardless of frequency of use.

Department Hit Frequency: Shows the total number of hits originating from the department, regardless of number of users.

Source: EAB, "Developing a Data-Driven University," (2010); EAB interviews and analysis.

Tailored Strategies When Faced with Non-adoption

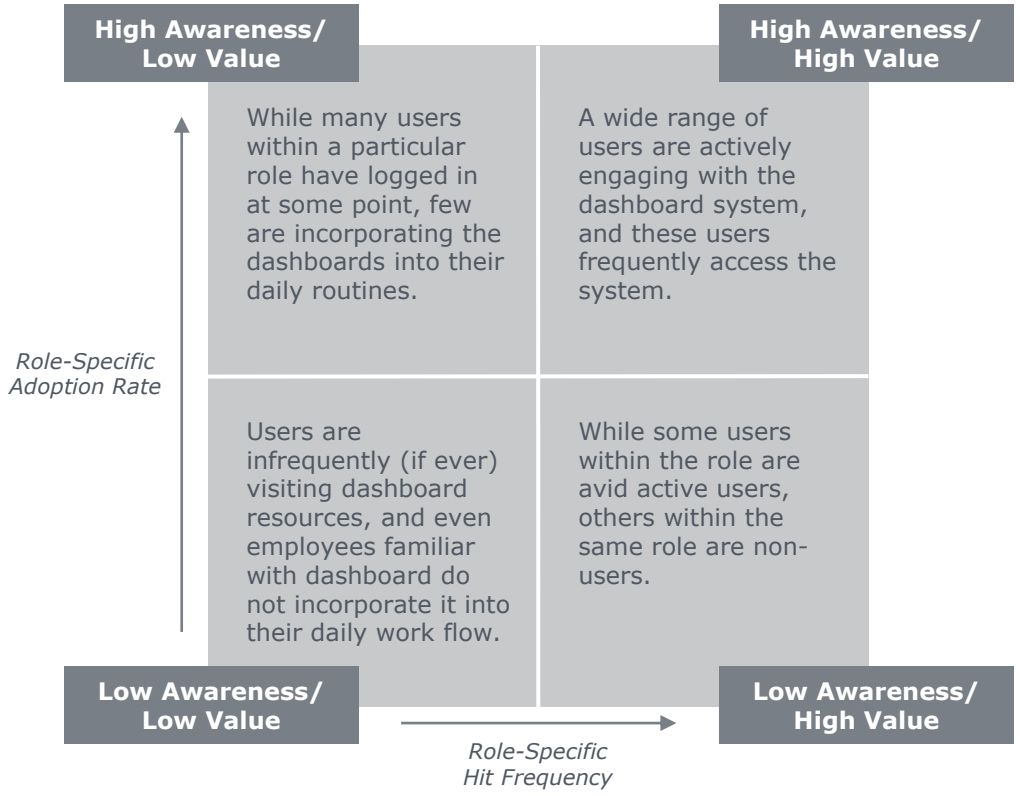
Detailed analysis of dashboard usage patterns can yield surprising discoveries and valuable information about how to encourage utilization among low- and non-adopters.

Dashboard administrators in the University Technology Office examine usage patterns by departments and roles (e.g., looking at accountants in Finance). Administrators examine (1) the role-specific adoption rate, or percentage of users within a particular department and role who have logged into the dashboards at any point in the past year, and (2) the role-specific hit frequency, or number of hits among dashboard-using employees within a particular department and role.

Each of the four resulting quadrants, while not explicitly prescribing action, point to a small set of potential issues that require further conversations and analysis to address. The following pages outline some of the most common diagnoses and solutions.

Examining Dashboard Statistics Within a Specific Department and Role

Measuring Awareness and Value of Dashboards



Source: EAB, "Developing a Data-Driven University," (2010); EAB interviews and analysis.

High Adoption Rate, Low Hit Frequency

If users within a particular department and role occasionally sign on to the dashboard but do not exhibit high hit frequency, this may indicate several potential problems.

Users in this quadrant are aware that dashboards exist, but for whatever reason are not fully incorporating the dashboard into their workflow. Most commonly, users in this category are loath to abandon existing shadow systems, such as Excel spreadsheets. In the case of senior managers who exhibit this usage pattern, they may be delegating "data fetching" to lower employees.

Identify Missing Role-Related Dashboard Functionalities

Usage Pattern

While many users within a particular role have logged in at some point, few are incorporating the dashboards into their daily routines.

Potential Diagnoses

- Rather than adopting dashboard system, users are maintaining their own shadow systems.
- Dashboard users in more senior positions are delegating dashboard interactions to more junior employees.

Illustrative Action Plan

- Roll out new dashboard functions that will draw users to the system more consistently and eliminate the use of shadow systems.
- Conduct training sessions targeted to senior users to reduce use of data-fetching "middlemen" and foster more direct interaction with system

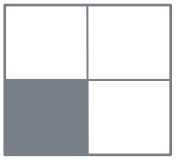
Source: EAB, "Developing a Data-Driven University," (2010); EAB interviews and analysis.

Low Adoption Rate, Low Hit Frequency

If there is a low adoption rate and a low hit frequency, the issue is most commonly that users are unaware of dashboard resources.

The most effective response is to provide additional training to promote awareness of existing resources. In certain cases, low adoption rate and low hit frequency can be an indicator that users had a negative initial interaction with the dashboard and never revisited. In either case, users in the low adoption rate/low hit frequency quadrant are critical to target in any adoption campaign.

Conduct Role-Based Training About Dashboard Functionality



Usage Pattern

Users are infrequently (if ever) visiting dashboard resources, and even employees familiar with dashboard do not incorporate it into their daily work flow.

Potential Diagnoses

- Potential users are not aware of full extent of dashboard resources.
- Dashboards landing page and navigational features are inadequate or non-intuitive.

Illustrative Action Plan

- Provide additional training sessions about dashboard functions, customized for each department to demonstrate how dashboards can assist with common key departmental processes.
- Invest programming resources into improving layout or developing more personalized "portal" home pages customized to individual users.

Source: EAB, "Developing a Data-Driven University," (2010); EAB interviews and analysis.

High Adoption Rate, High Hit Frequency

Administrators often focus too heavily on bringing low-adopting users aboard, while paying too little attention to existing "power users" who have already fully incorporated dashboards into their daily workflow.

Power users can provide immensely useful feedback about new dashboard functionalities, reports, and other features. Administrators examining usage statistics should also be aware that high hit frequency may indicate that power users are being forced to navigate through many pages to get to the data they want, artificially inflating the page hit count. This problem can be addressed by building special reports specifically tailored to the needs of a particular role and department.

Convene Power Users to Create More Advanced Applications

Usage Pattern

A wide range of users are actively engaging with the dashboard system, and these users frequently access the system.

Potential Diagnoses

- "Power users" may be hungry for more advanced applications that are not supplied in the existing dashboard.
- Drawing dashboard data from the system may require too many intermediate navigational steps, resulting in high page hit figures.

Illustrative Action Plan

- Based on user feedback, create special role-specific reports within dashboard system custom-tailored to the needs of particular categories of power users.
- Invest programming resources into improving layout or developing more personalized "portal" home pages customized to individual users.

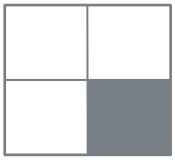
Source: EAB, "Developing a Data-Driven University," (2010); EAB interviews and analysis.

Low Adoption Rate, High Hit Frequency

The final quadrant represents variance in usage patterns within a given role and department—while some members are power users, their peers are not making use of dashboard offerings.

The solution in this case is to convene the entire group of power users and non-users to identify how the power users are taking advantage of the system. Non-adopters will realize how useful their peers find available dashboards and will often increase their own usage as a result.

Examine Users and Publicize



Usage Pattern

While some users within the role are avid active users, others within the same role are non-users.

Potential Diagnoses

- Non-users are unaware of benefits their peers within the same role are gaining from dashboard system.

Illustrative Action Plan

- Provide opportunity for active users to demonstrate to their inactive peers how they are benefiting from using the system in their daily workflow.

Source: EAB, "Developing a Data-Driven University," (2010); EAB interviews and analysis.

Customized Approach Drives Adoption

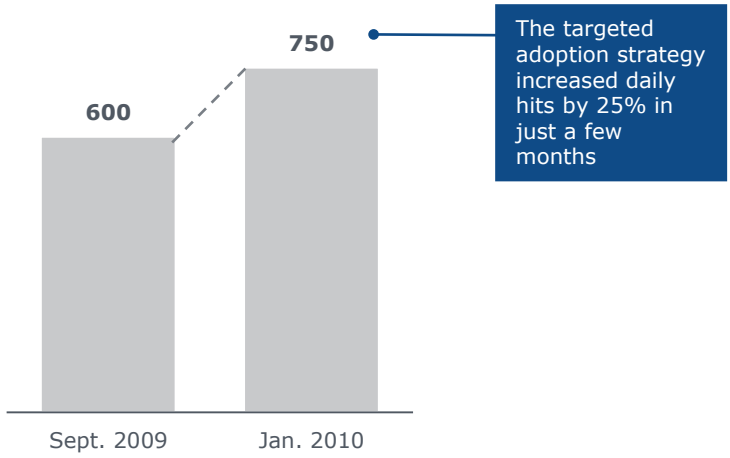
While this in-depth level of analysis and intervention is time- and work-intensive, it pays significant dividends in driving adoption.

At Arizona State University, the University Technology Office's concentrated adoption campaign increased dashboard usage by 25% in just a few months. Increased adoption reinforces itself; as more and more employees use dashboards, the system becomes established as the single source of truth on campus.

ASU Sees Significant Growth in Dashboard Adoption

Quick Increase in Breadth of Dashboard Use

Arizona State University



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Daily dashboard hits at Arizona State University in March 2015

Source: EAB, "Developing a Data-Driven University," (2010); EAB interviews and analysis.

Hallmark 16: Unit-Level BI Road Maps

Hallmark in Brief

In meetings with functional directors, BI teams use agile development principles to help directors identify and prioritize data requirements. A two-step prioritization process enables the BI team to help directors prioritize data needs based upon the level of data integration within the data warehouse and the degree of business process and logic complexity. BI teams also hold meetings with functional staff for live, interactive data analysis discussions to surface insights and potential candidates for business process changes.

Problems Addressed

User requirements evolve rapidly, and one-off report requests typically lead to more questions than answers. Campus members in functional units struggle to understand the data available to them for analysis, while BI staff know the available data but struggle to identify functional units' analytical needs.

Implementation Guidance

The George Washington University

- Institution type: Four-year, private
- Enrollment: 25,300 students (10,400 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Washington, District of Columbia)

St. Cloud State University

- Institution type: Four-year, public
- Enrollment: 16,800 (15,100 undergraduate)
- Carnegie classification: Master's university (larger programs)
- Campus setting: Small city (Saint Cloud, Minnesota)

Matchmaking Data Needs to BI Capabilities

To ensure its BI team builds reports users want, The George Washington University uses principles of agile development in a two-step prioritization process.

First, director-level staff (such as admissions and financial aid for an admissions-related project) prioritize their data desires in live sessions with BI staff. Prioritization is based on two factors: subject matter and desire to have particular data available in the data warehouse.

Next, BI staff take these desires and build a prioritization grid around ease of accomplishment for the BI team. This prioritization is based on how hard it would be to put the desired data into the data warehouse and how difficult it is to understand the logic behind the data.

BI staff present this grid to the functional directors, who again prioritize their desires with this new information in mind.

Finally, BI embarks on report development, armed with insights about the function's top priorities on which BI can deliver.

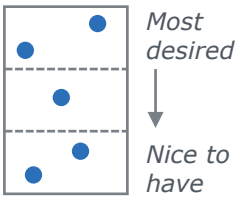
Two-Step Prioritization Process Rightsizes Expectations

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

1

Initial Prioritization

Functional groups convene, provide rankings on what data they want to be able to use

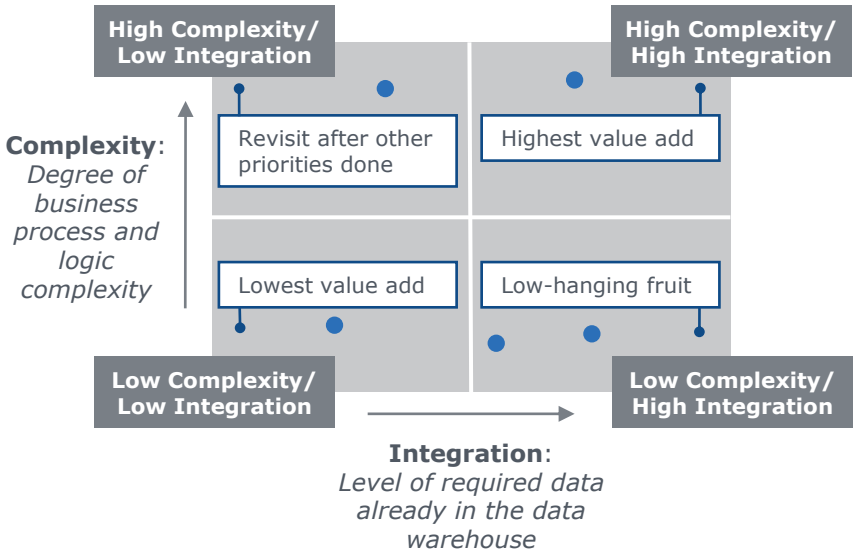


To reduce burden on BI staff, train the project management office to facilitate sessions.

2

Ease of Accomplishment Matrix

BI team assesses request complexity and integration needs to further inform prioritization. After additional prioritization by functional unit staff, agile development begins



Source: EAB interviews and analysis.

Functional SWAT Teams

An additional way to ensure that users get the most out of data is convening live give-and-take sessions between teams of subject matter experts and BI team members.

St. Cloud State University created a regularly convening analytics team for these groups to collectively build better reports to identify insights from the data.

Further, the St. Cloud State BI team leverages faculty volunteers across the University (from English to Geography) to assist with the analytics team's efforts. One faculty member's interest in the analytics effort resulted in a formal reassignment. A Statistics professor now conducts institutional data analysis 75% of his time and teaches 25% of his time.

Give and Take Between Terrain and Data Experts

Real Time, Dynamic Team Data Analysis

Clear Roles

IR: Pulls data and participates in data analysis (AVP of IR, data analyst, and statistics professor)

IT: Supports IR with data integration efforts (database architect, located in IR's office and paid by IR but reports to IT)

Terrain Experts: Provide insight behind data, ask questions (e.g., dean of undergraduate studies, director of admissions, director of financial aid)

Clear Expectations

Schedule: 6-8 people meet at fixed times every week (Monday, 2:30–4:30pm)

Agenda:

1. Review new data since last meeting
2. Ask "what if" questions and explore the data
3. Discuss data limitations; determine potential operational and process changes for better data management

Leveraging Faculty Expertise

- **Statistics** professor creates statistical models
- **English** professor helps with data visualization projects
- **Economics** professor contributes economic forecasting knowledge for enrollment projections
- **Geography** professor with GIS experience assists with geographic admissions projections

Source: EAB interviews and analysis.

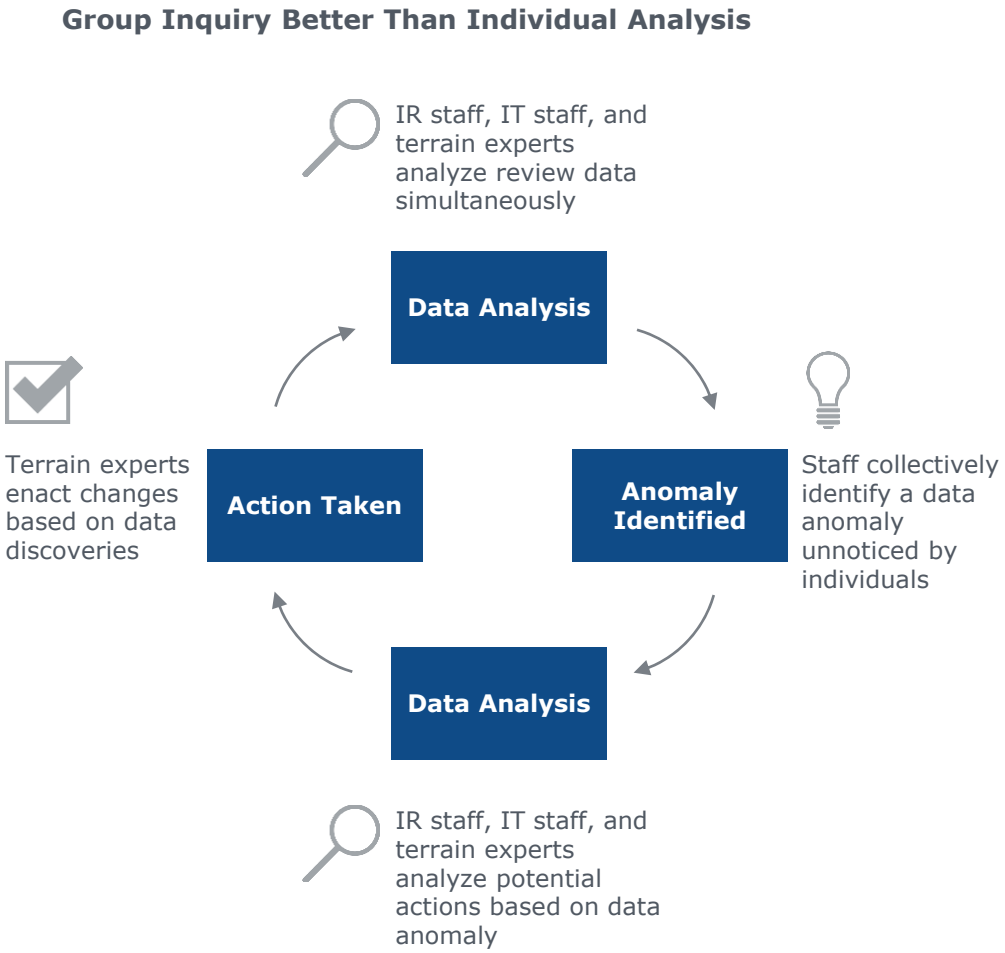
Insight: Some Assembly Required

Dynamic team interactions are key to the analytics teams' success at St. Cloud State.

One example of the enrollment management analytics team's success was identifying anomalies in student profiles based on admission tracks (i.e., honors, regular, conditional, community college referral). The team was able to use insights from data to adjust the admissions process and criteria to reduce variation in tracking and to encourage better student success. The team's insight streamlined a previously judgment-driven decision process and led to a significant improvement in student retention—3% institution-wide and 7% among conditional admit students—and process changes freed admissions staff from long hours of desk work.

The success of the initial enrollment analytics team inspired the creation of new analytics teams, with the enrollment team splitting into a pre-matriculation group to focus on admissions and recruitment and post-matriculation group to focus on student success. The university also formed a new academic operations team to analyze cost of instruction, course scheduling, and workload management.

Value of Live Group Data Analysis



Live Action Analysis

"It's one thing to talk about what questions we have, what we want to do, and then send the analyst away to do some analysis and come back with a report with what the data says. It's another thing entirely to have multiple people sitting in a space with a screen and laptops and different people working different data sets. Now, people can do some initial analysis and throw it up on the screen, which allows for real-time, dynamic analysis of the data as we dig further and further into what we have."

Lisa Helmin Foss, Associate Vice President and Associate Provost, Office of Strategy, Planning and Effectiveness, St. Cloud State University

Source: EAB interviews and analysis.

Hallmark 17: Crowdsourced Innovation

Hallmark in Brief

Suggestion boxes embedded in reports enable end users to submit feedback directly through the reporting platform. The feedback is self-contained within the platform, providing BI staff with all of the report details and context needed to act upon valid suggestions. BI teams modify reports according to campus members' ideas to increase the relevance and usefulness of central reports.

Problems Addressed

End users lack an easy way to provide suggestions to the BI team for ways to improve reports. Typical feedback mechanisms (e.g., emails, live meetings) fail to provide BI staff with all relevant report details and context needed to act upon valid suggestions. Lack of action on feedback discourages staff from providing suggestions and lowers user satisfaction.

Implementation Guidance

Oregon State University

- Institution type: Four-year, public
- Enrollment: 27,900 (23,200 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Small city (Corvallis, Oregon)

Creating a Report Requirements Feedback Loop

Crowdsourcing user feedback helps BI teams modify reports while reinforcing user engagement.

Oregon State University has embedded a feedback box within their reporting system that helps them stay up to date with user requirements. This service management process captures relevant contextual information to support follow-up, allows tracking of requests, and is self-contained within the BI tool.

In the past, staff submitted feedback and suggestions informally—through meetings, emails, and other avenues. With no formal or official way to give suggestions, however, most feedback went unvoiced. For the BI team, no process existed for following up on suggestions. Suggestions often lacked relevant information that would inform changes, and the BI team didn't have a way to track or prioritize ideas. Those issues have now all been addressed with the embedded feedback feature.

Formal Service Management for Report Modification Requests

Embedded Suggestion Boxes at Oregon State University

PAST

Informal Feedback Collection

Staff collect suggestions in an Excel spreadsheet

- Easy for feedback to get lost or not assigned to a staff member
- Challenging for users to identify to whom they should submit feedback
- Necessary report information typically not included in suggestions

Feedback mechanism included directly within reports; **submissions automatically include all pertinent user and report information**

Feedback **sent directly to BI team** with a suggestion system; suggestions marked as open until addressed

BI manager triages and assigns suggestions through standard work item process based on low, medium, or high impact of the proposed change

PRESENT

Formal Suggestion Feedback Loop

Feedback mechanism included directly within reports

- Feedback contained within BI system
- Increased ease of use from user perspective
- Suggestions and report histories open to users for review

Source: EAB interviews and analysis.

Suggestions Accelerate Report Improvement

While Oregon State's BI team does not promise that all suggestions will be implemented, over 80% have prompted report modifications, accelerating the improvements of report relevance.

When evaluating the validity of suggestions, the team considers the criteria listed at the right to filter out ideas that are infeasible for the team to act upon or that may be detrimental to reports.

But Not All Ideas Created Equal

81%

of the over 1,200 ideas submitted to the BI team have been implemented

Criteria for Non-implementation	
✖	**Security Issues**: Data or field requests in which the user's security level prevents seeing the data
✖	**User Training Needed**: User lacks basic understanding of the data
✖	**Negative System Performance**: User requests filters on fields that have a detrimental effect on system performance
✖	**Approval Required, Denied**: Data steward does not approve the request
✖	**Data Unavailable**: Data requested not available in source systems
✖	**Improper Formatting**: Request not in alignment with reporting standards
✖	**Improper Metrics**: Request not in alignment with standard university metrics

Source: EAB interviews and analysis.

Beyond Order Taking

With more relevant reports comes more user satisfaction (and adoption). Suggestions submitted to the BI team vary, from pointing out errors in data formatting to the need to be able to search by title.

Even very simple suggested modifications (for example, adding a sort or a new column) can often increase the relevance of an existing, standard report without adding to the inventory of reports.

Oregon State University's tool is built directly within their web-based reporting interface. Staff at institutions whose reporting interfaces lack this functionality could build it outside of the reporting system or through Application Programming Interfaces (APIs).

Suggestions Help BI Manage Report Portfolio While Adding Functionality for Users

Easy Modification Precludes a Duplicative Report

Example Ideas for a Validation Activity Report

Suggestion	Type	Impact	Status	Resolution	Description
Update Disclaimer	Task	Low	Closed	Delivered	Update disclaimer. Remove report name from footer—should just be report code.
Need to Be Able to Search by Title	Issue	Low	Closed	Delivered	Need to be able to search by title.
Active/ Inactive Not Working	Issue	Medium	Closed	Delivered	The Active report lists all activity codes both active and terminated. The Inactive did not list anything.
Active/ Inactive Indicator Is Not Correct	Unassigned	Unassigned	Closed	Delivered	Need to research if OSU is maintaining the Active Inactive indicator and NCHG_Date correctly in Banner. It appears that DW is only looking at the Term Date field and ODS is looking at the Status field.
TERM Data Is Not Formatted as Date Field	Feature	Low	Closed	Delivered	TERM Data not formatted correctly.

Source: Oregon State University; EAB interviews and analysis.

Opportunity for Input Proving Popular

Fast response times to user suggestions reinforce the virtuous feedback cycle.

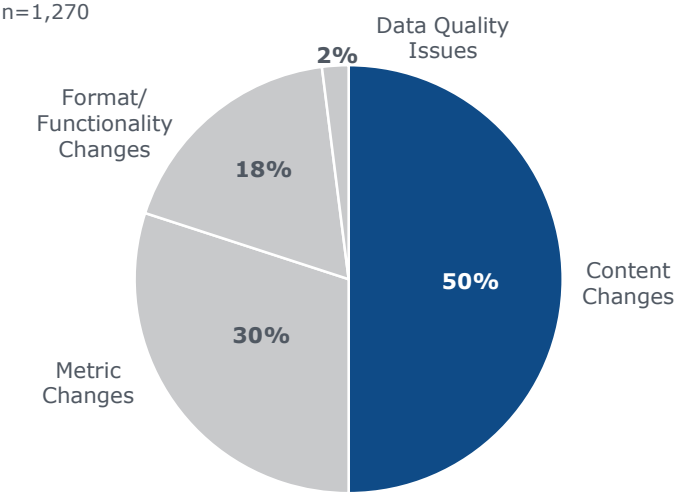
Oregon State's BI team aims to respond to simple requests immediately, encouraging continued engagement with the BI resources and therefore use of central data. As a result, adoption of the suggestion box feature is fairly high, with most reports having more than five ideas submitted for them.

While use of this feature may decrease over time as adoption increases (i.e., as users trust the data as the single version of the truth, data quality increases, and the reports meet broader user needs), the wins that it produces in the near term make it worthy of replication for universities looking to increase marginal BI adoption.

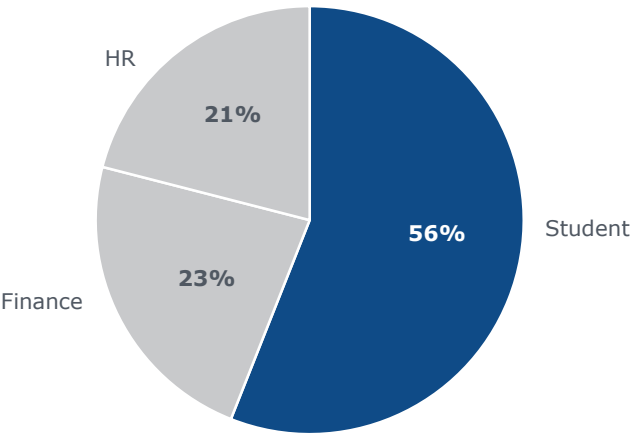
Continued User Engagement Results in Better Content and More Functionality

Submitted Suggestions by Type

n=1,270



Submitted Suggestions by Data Domain



Typical Number of Suggestions by Report Type

Source: Oregon State University; EAB interviews and analysis.

Hallmark 18: Low-Cost Bridge Workarounds

Hallmark in Brief

Business intelligence staff hold user group meetings with report writers to share promising practices and frustrations. BI staff identify addressable frustrations and create simple workaround tools to increase report writers' satisfaction and efficiency.

Problems Addressed

Distributed report writers create personalized workarounds for problems that likely affect many across campus. In the decentralized environment of higher education, BI staff lack an opportunity to identify shared concerns across end users. Inefficient processes continue that could be easily addressed with a centrally developed and distributed tool.

Implementation Guidance

Vanderbilt University

- Institution type: Four-year, public
- Enrollment: 12,800 students (6,800 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Nashville, Tennessee)

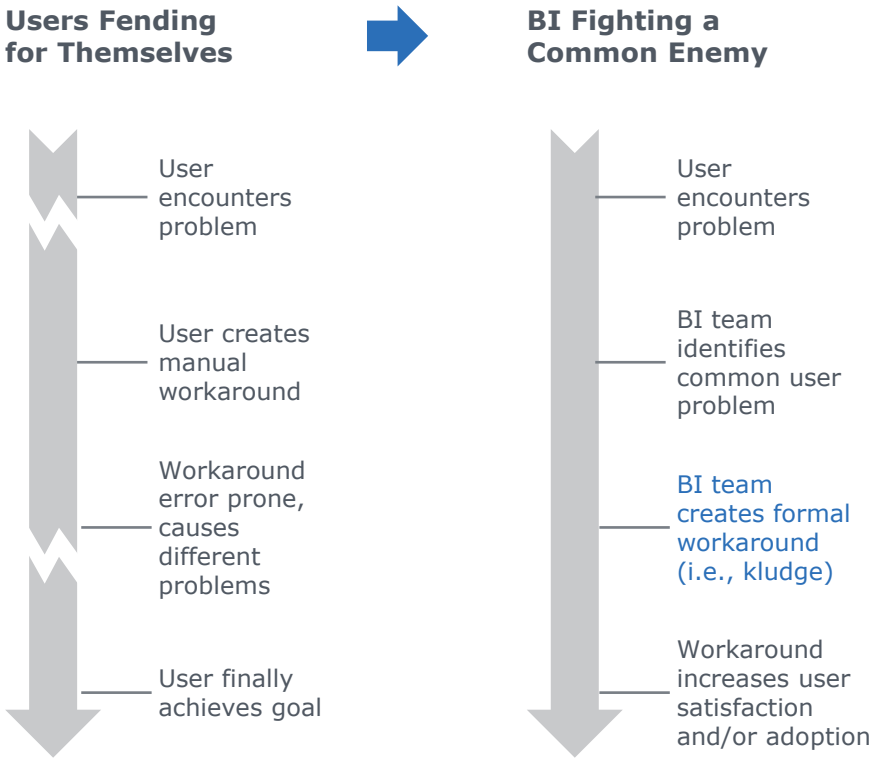
Kludges to the Rescue

Stop-gap measures may sometimes be desirable to curb inefficient processes from limiting staff productivity.

Some business intelligence teams have built simple widgets to automate or streamline clunky or error-prone processes. These additional tools aim to limit the complexity of BI, not add to it.

While the addressed processes may ultimately benefit from a redesign of a business process of workflow, often a pursuit of perfection can distract from investing in "good enough" workarounds.

Don't Let the Perfect Be the Enemy of the Good



Defining Kludge

An inelegant but effective workaround to a problem.

Source: EAB interviews and analysis.

Surfacing a Common Problem

One example of a low-cost bridge workaround that increased business intelligence user satisfaction and efficiency comes from Vanderbilt University.

The Vanderbilt BI user group surfaced a problem shared among many users concerning query input. Typically, report writers receive requests in a format that is incompatible with the reporting platform's querying logic. BI staff found that report writers manually entered the requests, a time-intensive process prone to errors, or created Excel-based workarounds to expedite query creation, which was also error prone.

BI staff saw this as an opportunity to eliminate personal workarounds and create a tool to solve this problem and increase report accuracy and report writer efficiency.

Manual Workarounds for Query Input Error Prone, Inefficient

Requests for Reports Come in Unformatted Forms

Bob,

Can you please send me a report listing the employees in the following departments:

Dept_A

Dept_B

Dept_C

…

Sue,

Can you please send me a report listing the employees in departments of column A in the attached spreadsheet?

Query Input Errors During Report Pulls

Status Quo

- Report writers **manually adjust lists of values into strings of values** to enter them into the reporting platform (SAP Business Objects)

Problems/Frustrations

- Time consuming to manually type everything
- Faulty workarounds created
- Incorrect value entry due to human error:
  - Wrong results if an incorrect value is entered (e.g., Dept_C entered for Dept_D)
  - Blank results if an invalid value is entered (e.g., Dep_D entered for Dept_D)

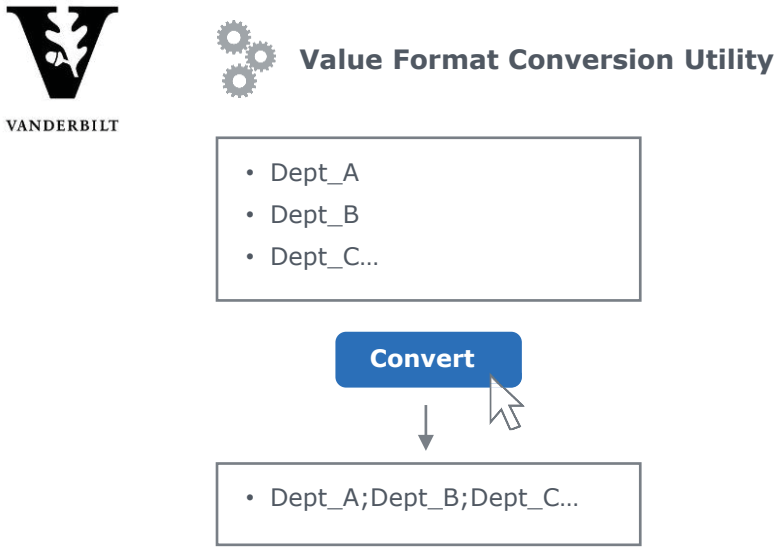
Source: EAB interviews and analysis.

Run It Right the First Time

To prevent typos and other mistakes in query creation, Vanderbilt University created a web application that converts a list of values into chained strings of values for entry into the university's reporting platform, SAP Business Objects. This tool eliminates the tedious and error-prone methods of query creation that can return null results and frustrate users.

Campuses that use a reporting platform that requires concatenated strings for entry may use the tool developed by Vanderbilt, which can be found at the link to the right.

Shareware for Report Authors



Quick Wins

- Increased standardization
- Increased report quality
- Increased staff engagement

Hours of Development

20-80

Contacts estimate that creation of such a tool may take 20 to 80 hours of development and testing. SAP Business Objects users may use Vanderbilt's publicly available utility, which can be found at: https://www4.vanderbilt.edu/datagovernance/links-and-tools/BusinessObjectsPromptConverter.html.[1]

1) Vanderbilt University holds the right to modify or remove the tool at any time; external users of the tool assume all risks associated with using 'shareware' tools; Vanderbilt is not responsible for making modifications to the tool in order for it to comply with web browsers that the University does not use.

Source: Vanderbilt University, "Business Objects Prompt Converter," https://www4.vanderbilt.edu/datagovernance/links-and-tools/BusinessObjectsPromptConverter.html; EAB interviews and analysis.

Organizational Continuity

PART 5

- Hallmark 19: Centralized BI Group
- Hallmark 20: Chief Data Steward

Something's Not Working

EAB research identified many business intelligence efforts that stalled or failed, data governance committees that disbanded, and analytics-related campus initiatives that were deprioritized due to lack of support. At the same time, campus desire for BI has led to inefficient spend as distributed units buy their own licenses for BI-related tools.

The IT Forum's BI survey found that 40% of BI efforts lack a dedicated leader. BI is an initiative that must garner enterprise-wide support to succeed, and the effort does not work well as a self-managed workgroup.

Most institutions also fail to leverage existing campus expertise for analytical efforts. One director of an analytics graduate program lamented that though he offered students to do free BI work for the institution, the university has never taken him up on the offer.

Effectiveness Low, Inefficiency High

EAB 2014 BI Survey

Lack of Strategic Central Leadership

Is there a dedicated leader for your BI initiative?

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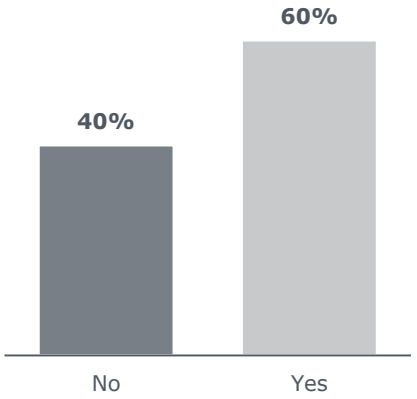

Untapped Institutional Expertise

Do you leverage expertise of non-IT or IR staff for BI?

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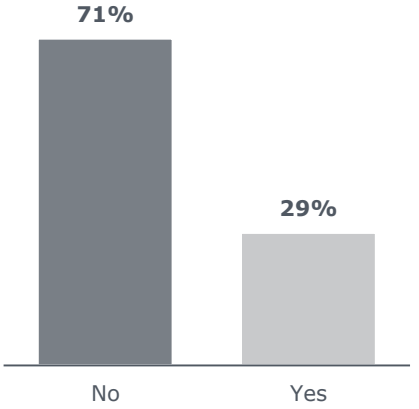

Inefficient Distributed Spend

15 Distributed Cognos licenses discovered at one research university at the start of a coordinated BI effort

Source: EAB ITF Forum 2014 BI Survey; EAB interviews and analysis.

Finding the Right Home for BI

The question of where business intelligence should report is one widely debated in private industry, but less so in higher education. At over 85% of the institutions in the IT Forum's BI survey, BI reports through IT. At none of the surveyed institutions did BI report through a unit outside of IT or IR.

In private industry, on the other hand, BI reports through IT much less frequently. Many data management experts claim that though IT may seem a logical placement for BI, placement there may hamper BI efforts. BI requires enterprise-wide buy-in, high-quality data, and adoption by business unit directors, all of which IT has little control over. Almost half of private industry BI teams report outside of IT, demonstrating that BI has received sponsorship from executives like chief financial officers, chief operating officers, and chief executive officers.

BI in higher education cannot be compared directly to BI in private industry, however. There is no analog for IR in private industry, and the missions of higher education institutions are much more diverse than those of companies.

Higher Education a Different Animal Than Private Industry

Organizational Location of BI Teams

Higher Education

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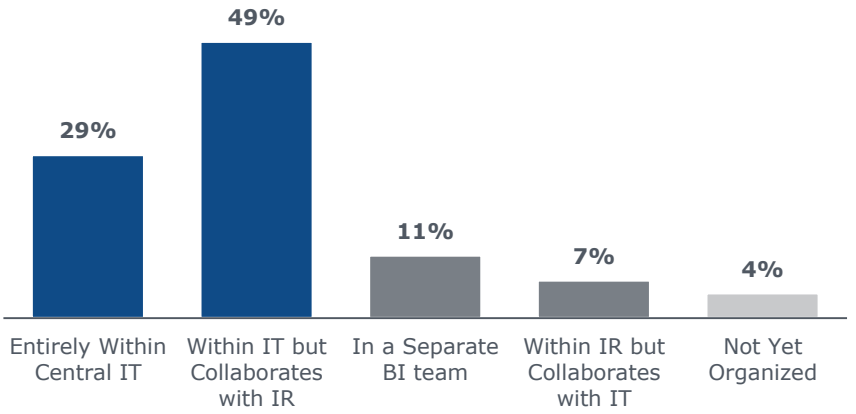
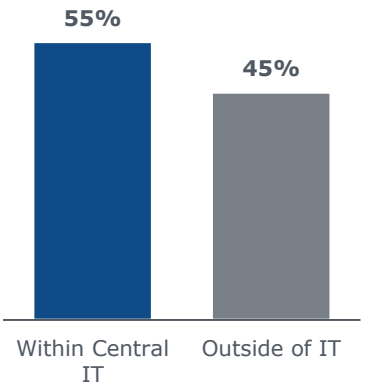


- **75%** of efforts are led by IT
- **56%** of efforts are collaborations between IT and IR

Private Industry

n=461



- **55%** of efforts are led by IT
- **No exact analog** for IR in private industry

Source: "2013 TDWI Benchmark Report: Organizational and Performance Metrics for Business Intelligence Teams" The Data Warehousing Institute (2013); EAB ITF Forum 2014 BI Survey; EAB interviews and analysis.

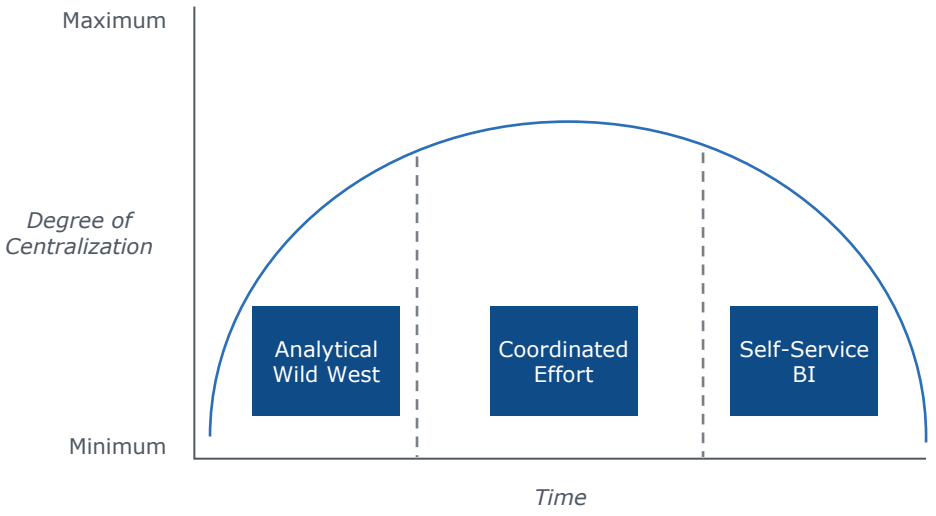
Strong Central Effort Precedes DIY Analytics

A lack of coordination among campus members who use data for decision making has created an "analytical Wild West" at many institutions. However, a goal for many CIOs is to have BI as distributed as possible—self-service BI.

Before self-service BI can be achieved, though, a central effort is required to create standard processes, systems, and capabilities. After maturity occurs in areas such as data governance and data management, BI can be released back into end units to promote innovative uses of data.

No Shortcut on the Way to Self-Service BI

Organizational Evolution of Analytical Efforts



When to Centralize?

"…On balance, decentralized approaches are best suited where innovation is the primary objective, whereas centralization is best where efficiency (capturing economies of scale and scope) is paramount."

Richard Katz, Former VP of EDUCAUSE

Source: Katz R, "IT Matters: Centralization or Decentralization May Not!" EDUCAUSE (2007); EAB interviews and analysis.

Hallmark 19: Centralized BI Group

Hallmark in Brief

Leaders collect the top-skilled analytical staff from across the institution into one central business intelligence team. This team may include a partial or full combination of existing institutional research and business intelligence staff.

Problems Addressed

Distributed analytical staff work independently, failing to leverage economies of scale in purchasing and duplicating efforts. Institutional research and business intelligence teams remain separate, with potentially competing data philosophies and failing to take advantage of complimentary skill sets.

Implementation Guidance

Oregon State University

- Institution type: Four-year, public
- Enrollment: 27,900 (23,200 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Small city (Corvallis, Oregon)

University of Arizona

- Institution type: Four-year, public
- Enrollment: 40,600 students (31,700 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Tucson, Arizona)

University of Kentucky

- Institution type: Four-year, public
- Enrollment: 28,400 students (21,400 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Lexington, Kentucky)

To IT or Not to IT

Many private industry consultants recommend that BI teams report to a unit other than IT, such as finance or sales. The argument runs: Because IT does not directly benefit from successful BI, the incentives for success lack alignment with the IT organization.

Nevertheless, IT remains the typical placement for BI in higher education because IT staff naturally hold data-related skill sets.

Thought leaders in higher education lack agreement on the correct reporting line for BI, but successful BI efforts exist within both reporting structures. The considerations at right may help determine where BI should report in your organization.

To Whom Should BI Report?

\+

Pros of Reporting Through IT

- IT may be **mission neutral**, supporting the entire institution and not focused on administration or academics
- IT staff have the **coding and development skills** necessary for deploying BI solutions
- IT staff hold the most **experience with data architecture**

BI Reporting to IT May Be Preferable If…

- IT maintains a strong campus brand
- IT leadership has analytics credibility
- Warehousing efforts are at an early stage

\–

Cons of Reporting Through IT

- **Data creation, management, and use typically occur outside of IT**, and IT has minimal influence over these activities and related business processes
- **Failure to use data well impacts IT minimally** compared to other units
- Campus members **might consider BI an IT project**, not an enterprise process

BI Reporting Outside of IT May Be Preferable If…

- IT is seen as a commodity service
- BI strategy is focused on one institutional area
- Analytics infrastructure is self-sustaining

Source: EAB interviews and analysis.

Cherry-Picking the Finest

The high market demand for business intelligence analysts has made external hires of BI experts cost-prohibitive for many higher education institutions. Recognizing this, Oregon State University's CIO conducted an internal search for staff to create a centralized BI group.

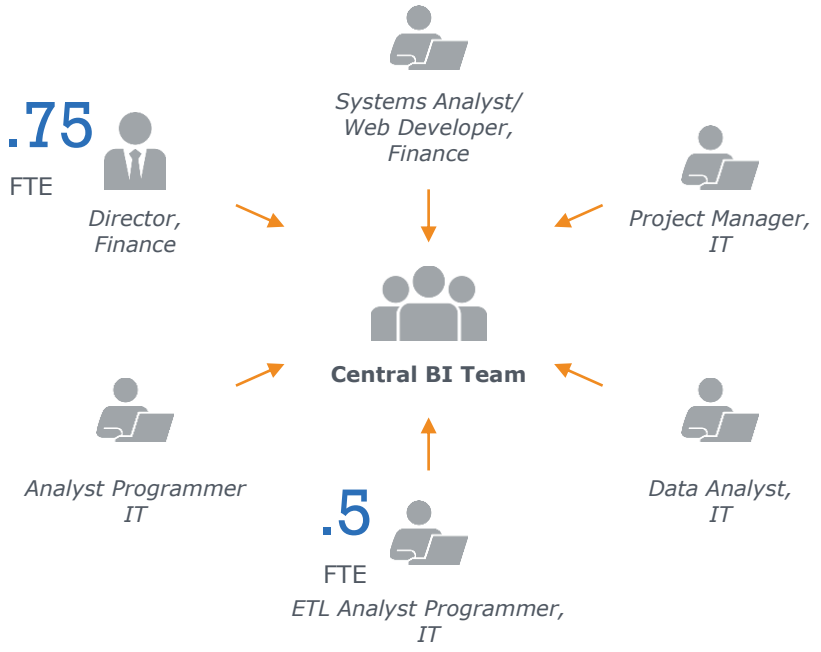
With provost and CBO support, the CIO assembled six individuals from IT and finance for the BI team. The CIO sought staff with a combination of soft skills, such as relationship building and creativity, plus technical skills such as programming and data architecture. The staff dropped previous assignments, determined by campus leadership as less valuable to the university than advances in BI, and were colocated to promote collaboration across the team.

Since all members of the BI team were reallocated internally, there was no additional budget required for staff. The only incremental spend in the team's creation was $36,000 for additional Jaspersoft features; all other necessarily technology had already been purchased by the university.

The All-In BI Effort at Oregon State University

Formation of a Central BI Team

Six Staff from Finance and IT Hand-Picked by CIO to Create One Central BI Group



Soft Skills Just as Important as Tech Skills

Skill sets sought for central BI team:

- Ability to work in a high-energy, fast-paced environment
- Ability to be innovative
- Strong work ethic
- Relationship building skills
- Programming skills
- Data architecture skills

$36,000

Only incremental spend since the start of the project in April 2013 (for extra Jaspersoft features). This does not include sunk BI technology costs of existing tools.

Source: EAB interviews and analysis.

Twins Separated at Birth

To many campus members, business intelligence and institutional research appear identical. A primary objective of each unit is to provide data to the campus, and users care more about the data than who provided the data.

However, the two units approach this objective differently. The BI team may provide more up-to-date information, pulled from a daily data export of live systems, while IR is focused more on audit-like reporting and may only provide validated data.

Combined, the two units may be complementary to each other, leveraging IR's strength of understanding the meaning and context of data with BI's strength of understanding the provenance of data.

BI and IR's Complementary Skill Sets Rarely Leveraged Together

Takes a Closer Look to Discern Differences

	IR	BI
"How would you get me current enrollment numbers?"	Checks enrollment data from last student census date: 36,521	Pulls enrollment data from yesterday's data load: 36,483
"Who's your boss?"	Provost	CIO
"Who are your constituencies?"	Internal (e.g., deans) and external (e.g., Department of Education) constituents	Internal constituents only
"What's your expertise?"	Better understanding of the meaning and context of data	Better understanding of the production and technical provenance of data
"How open should data be?"	Data should be carefully managed and communicated	Data should be as free as possible

Source: Childers H, "BI + IR: Shotgun Wedding, or Marriage Made in Heaven?" (2015); EAB interviews and analysis.

The Future of BI? Merging BI and IR

Some higher education institutions have recognized the complementary skill sets of BI and IR and have merged the two units.

The University of Arizona and the University of Kentucky each took advantage of IR leader retirements to reassess their institutions' approaches to data provisioning and analysis. The new units at both universities expect significant benefits, including staffing efficiencies and expedited analytical efforts.

One Data Philosophy with Benefits of Both Skill Sets

Occasion: Retirement of the University of Arizona's IR director

Reason: Opportunity to reevaluate data needs

New Unit: University Analytics and Institutional Research

Reports to: Provost to convey credibility and alignment with academic mission.

Benefits Expected:
- Collaborative design of a "single source of truth" system
- Administrative staffing efficiencies
- Accelerated data integration
- Speed to predictive analytics launch

Occasion: Retirement of the University of Kentucky's VP of IR

Reason: Opportunity to consolidate data efforts and try new approaches

New Unit: Institutional Research and Advanced Analytics

Reports to: SVP for Analytics and Technology

Benefits Expected:
- Focus on specialized staff: data developers and data scientists
- Staff savings of $180,000 per year
- Single data architecture philosophy
- Reverses IR's "data gatekeeper" posture

Source: IDC, "University of Kentucky Leveraging SAP HANA to Lead the Way in Use of Analytics in Higher Education" (2014); EAB interviews and analysis.

Flexing the Staffing Muscles

Models for jointly funded analytical positions have enabled the expansion of BI talent without relying solely on the BI team to fund this staffing.

At the University of Arizona, four functional units help finance central BI positions. The BI team manages the staff, but the staff focuses BI efforts on the contributing units' needs.

The University of Kentucky organizes a similar model, in which units sponsor student interns in the BI unit.

Adding Capacity Through BI-Business Talent Sharing

Jointly Funded Positions and Sponsored Internships

Positions managed by central BI group but dedicate majority of their time to the sponsoring unit's data analysis

Units contributing to jointly funded positions at the University of Arizona:
- Student Affairs & Enrollment Management
- Human Resources
- Alumni Association
- Training

Units with sponsored internship positions at the University of Kentucky:
- College of Arts and Sciences

> "The intern gets all the benefit of being with a group of people who know this data well and work it hard, but the intern focuses on the funding college's priorities."
>
> *Vince Kellen, Senior Vice Provost for Analytics and Technologies, University of Kentucky*

Source: EAB interviews and analysis.

Hallmark 20: Chief Data Steward

Hallmark in Brief

A full-time staff member leads efforts for institutional data management and adoption of data-driven decision making. Options for the chief data steward role include a dedicated data governance director (focused on tactical data governance work) or a chief data officer (focused on strategic organization and architecture as well as overseeing data governance). Responsibilities for the chief data steward role include: leading data definition creation, overseeing data quality processes, developing data management policies, helping design the data warehouse and data integration, and promoting use of analytical tools.

Problems Addressed

A data governance committee chair oversees data management efforts as a side-of-desk responsibility. This role becomes too time consuming, the staff member drops it, and data governance responsibilities are not reassigned. When no leader exists to hold data governance committee members accountable to complete follow-up tasks from meetings, efforts stall or fail due to frustration among members.

Implementation Guidance

Wichita State University

- Institution type: Four-year, public
- Enrollment: 14,400 students (11,700 undergraduates)
- Carnegie classification: Research university (high research activity)
- Campus setting: Large city (Wichita, Kansas)

The Data Standard-Bearer

Oversight of institutional data management cannot be a side-of-desk responsibility. Executives who support this notion of a dedicated role have created leadership positions for oversight of data management. Some institutions have established full-time data governance directors, while others have hired chief data officers.

Both positions share a core set of responsibilities, including leading data definition creation, overseeing data quality processes, developing data management policies, helping design the data warehouse and data integration, and promoting use of analytical tools.

Most higher education data starts out as too low quality for analytical use, and many institutions lack standard data definitions. Thus, institutions that are committed to making better data-driven decisions should consider hiring full-time data governance directors to lead the effort to clean up institutional data and ready it for strategic use. Chief data officers are more strategic, envisioning optimal data use and architecture.

Two Roles for Advancing the Use of Institutional Data

Options for a Chief Data Steward Role

	Full-Time Data Governance Director	Chief Data Officer
Core Duties	• Leads data definition creation • Coordinates data governance meetings • Develops data governance policies • Advises campus members on data management and data use • Maintains the data dictionary	• Leads data definition creation • Coordinates data governance meetings • Oversees data quality processes • Develops data management policies • Oversees the design of the data warehouse and data integration • Encourages use of BI for decision-making and strategic planning
Desired Attributes and Skill Sets	• Broad understanding of higher education operations • Experience with higher education data (from one or more functions) • Respected among colleagues on campus • Project management skills	• Experience with data architecture, data management, and development of data governance • Strong communication skills for both executive-level and technical implementation discussions
Estimated Salary (USD)	$80K-110K	$125K-165K
Nature of Role	Temporary; operational (may lead to CDO)	Permanent; strategic

Source: EAB interviews and analysis.

What Does a Data Governance Director Do?

Existing data governance committee chairs cannot assume the role of data governance directors because the responsibilities require full-time attention. At institutions that employ data governance directors, these directors chair and lead data governance committees.

To be successful, data governance directors must not only oversee data management but also lead change management efforts and departmental assistance, along with advancing personal and institutional knowledge of data governance best practices.

Diverse Activities Require Broad Skill Set

Responsibilities of a Data Governance Director

Data Management

- *Data Definitions*:
  Lead committee meetings to develop definitions for terms and reports
- *Root Cause Analysis:*
  Navigation of politically sensitive data and process topics to better understand underlying issues

Change Management

- *Cultural Change:*
  Socialization of why data governance is important and what data governance is
- *Problem Management:*
  Manage improper or incorrect reporting

Project Guidance

- *Unit-Level Guidance:*
  Attend project teams' meetings to provide guidance on technology upgrades and implementations
- *Systems Assessment:*
  Identify systems opportunities for better data quality and integrity

Personal Learning

- *Institutional Benchmarking:*
  Research into what's working for other higher education institutions
- *Promising Practice Identification:*
  Participation in webinars and other forums concerning data governance

Source: EAB interviews and analysis.

Rise of a New "Chief" Position

The Chief Data Officer role is relatively new, not only in higher education but also in private industry. The first chief data officer was hired by Capital One in 2002, and only about 250 chief data officer roles existed at all in 2014. Higher education institutions in North America compose eight of those positions.

Chief data officers are responsible for designing an organization and data architecture to meet institutional data needs for decision making.

They oversee data governance and quality (e.g., data standards, data definitions, metadata), organizational strategy for BI, and reporting standards. They also promote data-driven decision making across campus and advocate for a "single version of truth" on campus.

As the role is new, many chief data officers lack clear direction for their responsibilities. Most maintain goals of regulatory compliance, analytical modelling, data cleansing, data governance, and/or revenue growth.

Chief Data Officers Appearing in Higher Education

2014 Snapshot of the Chief Data Officer Role

U.S. Higher Education

8

CDOs identified in higher education

Institutions:

- Cornell University
- Kennesaw State University
- Purdue University
- Savannah State University
- University of South Carolina
- University of Wisconsin
- University System of Georgia
- Wichita State University

Global Organizations

~250

Estimated CDOs across the world by end of 2014

Example Organizations:

- Cambia Health Solutions
- City and County of San Francisco
- IBM
- Nationwide Insurance
- ShopAdvisor
- State of Colorado
- TD Bank
- Wells Fargo

What's My Role Again?

"If someone today tells you they know how to do the chief data officer's function, they're lying to you."

Richard Wang, Director of MIT's CDO and Information Quality Program

Five Types of CDOs

1. **Regulatory:** Keeps the institution out of trouble
2. **Analytics:** Creates data models and analyses
3. **Data Quality:** Cleans up poor quality data
4. **Governance and Policy:** Fixes poor business processes in relation to data
5. **Revenue:** Identifies and optimizes revenue sources through data use

Source: Chief Digital Officer Summit, "Talent Map 2014;" May T, "The Five Flavors of Chief Data Officers," Forbes (2014); EAB interviews and analysis.

A Letter from the Future

Most higher education chief data officers oversee a combination of data management, BI, and IR, but EAB found one that also oversees several functional units.

The Associate Vice President for Academic Affairs and Chief Data Officer at Wichita State University also maintains responsibility for the registrar, undergraduate admissions, financial aid, and international education. This role is a peer of the CIO, and works collaboratively to advance data and technology at the University.

While appropriate organizational structure will vary by institution depending on history and culture, this model may be suitable for institutions looking to improve data quality and data-related processes.

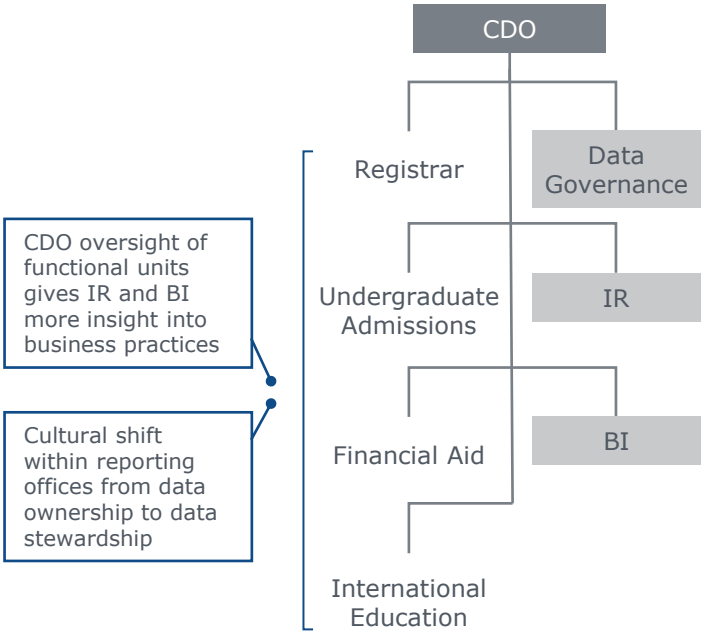
A Hypothetical CDO Role in Higher Education…

…Isn't Actually Hypothetical

WICHITA STATE UNIVERSITY

Dr. David Wright, Associate Vice President for Academic Affairs and Chief Data Officer

Functional Units Reporting to CDO Allow for Data-Focused Business Process Redesign



Source: EAB interviews and analysis.

Implementation Resources

APPENDIX

Using the Appendix Resources

In the following pages, the IT Forum has provided resources that CIOs can use on campus to help implement best practices.

Please reach out to your dedicated advisor or a member of the IT Forum team if you are interested in learning more about other tactics in this report, or to speak about implementing these practices in your own campus environment.

More implementation resources can also be found on our website, eab.com.

Templates and Tools

Additional Implementation Resources

Additional implementation resources, covering many of the best practices identified in this study, can be found on the study's webpage.

To learn more, visit:
eab.com/itf/2015/commoncurrency

Data Governance Leadership

Guide to Selecting Committee Members

Potential Governance Committee Members

Institutional Office	Data Strategy Committee *VP- to AVP-Level*	Data Governance Committee *AVP- to Director-Level*
Advancement	• Chief Advancement Officer	• Director of Development
Audit and Advisory Services		• Director of Internal Audit
Athletics		• Associate Athletic Director • Athletics Compliance Program Director
Business Intelligence	• Director of Data Governance	• Director of Data Governance • Director of Business Intelligence • Data Architect
CBO's Office	• Chief Business Officer	• AVP of Finance • AVP of Facilities • Budget Director
Human Resources	• VP of Human Resources	• Director of Human Resources • Payroll Manager • HRIS Manager
Information Technology	• Chief Information Officer	• Information Security Officer • Director of Information Technology
Institutional Research	• Director of Institutional Research	• Associate Director of Institutional Research
Provost's Office	• Provost	• AVP of Planning • AVP of Student Success • Director of International Education • Librarian
Security/Risk/Legal	• General Counsel	• Associate General Council • Director of Risk Management • Chief of Police • Director of Compliance
Student Affairs	• VP of Student Affairs	• AVP of Student Affairs • Director of Student Services
Registrar's Office	• Registrar	• Associate Registrar • Director of Enrollment Management (Undergraduate) • Director of Enrollment Management (Graduate)
Research	• VP of Research	• Director of Research and Compliance

Data Stewardship Responsibilities

Formalizing Data Stewardship Responsibilities in Job Descriptions

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

Data stewards are responsible for the subset of data in their charge - Data stewards serve as a focal point for data governance activity and issue resolution. It is the responsibility of each data steward to manage quality of a subset of data within their charge. That include but it is not limited to working collaboratively with other data stewards to develop business definitions, business rules and manage and maintain the data assets for the data within their charge.

Responsibilities

Data Stewards are university business officials having direct operational-level responsibility for the management of one or more types of Institutional Data and have authority to make decisions. A data steward is primarily responsible for:

- Developing and maintaining data classification policies. Work with Information Owners to assure that data is classified as restricted, regulated or public as it relates to the distribution of the data.
- Developing, implementing, and managing data access policies. Assure that there are documented and published processes for granting system access and privileges in the business area.
- Ensuring that data quality and data definition standards are developed and implemented.
- Interpreting and assuring compliance with Federal, State and University policies and regulations regarding the release of, responsible use of, responsible use of, and access to institutional data.
- Coordinating and resolving stewardship issues and data definitions of data elements that cross multiple functional units.
- Analyzing data for quality and reconciling data issues.
- Creating and maintaining consistent reference data and master data definitions.
- Propose and review new business terms
- Review Request for Data Sharing agreements and provide approval or rejection and provide comments.
- Log Data Quality Issues and work towards the resolution of data quality issues.
- Attend stewardship group meetings - Groups typically meet for 1 hour once a month; members should plan to attend consistently. If conflicts arise, absent members should ensure that their unit's perspective is represented by asking colleagues to attend in their place

Required Skills

- Broad-based knowledge of the data for which they are a steward. This knowledge should encompass all uses of the data as viewed from the University's perspective.
- Knowledge of how University business processes relate to their data.
- The flexibility to view their data as a University resource.
- The ability to work effectively within a team in performing the required tasks.
- The ability to communicate effectively in response to questions concerning the data.
- The ability to communicate effectively in writing in the many definition and documentation tasks involved in this role.
- The ability to utilize appropriate interpersonal styles and methods of communication to encourage the proper use of the University's information resource.
- The ability to complete work in sufficient detail to ensure integrity and completeness, and to identify inconsistency.

Source: "Data Stewardship Responsibilities" George Washington University (2015); EAB interviews and analysis.

Guidelines for Improving Data Entry Processes

Checklist for Cleaner Data

_____ 1 **Identify data elements that have recurring quality issues**

Methods to identify the "usual suspects" for poor-quality data include:

- Comparing results when different departments pull similar reports
- Meeting with IR staff to discuss data discrepancies they've witnessed
- Asking department heads which data they trust least because of potential quality issues

_____ 2 **Identify campus members who are knowledgeable about the related data entry processes and how the data is used for decision making**

The following campus members may possess useful information on these issues:

- Data entry staff and their managers
- Campus members who use the data to inform decisions

_____ 3 **Determine current practice for data entry in different departments across the institution and identify the user requirements for data use**

_____ 4 **Fix system problems that lead to poor-quality data entry**

Potential workarounds or other solutions may include:

- Converting open fields to drop-down menus
- Limiting the range of acceptable numerical entries
- Providing temporary solutions for unknown values, to be fixed later

_____ 5 **Assign one campus member to develop a standardized process for data input and maintain responsibility for the process moving forward**

Potential candidates include:

- Business intelligence analyst
- Director of the department that performs the most relevant data entry

Decisions to make include:

- Who owns responsibility for relevant data entry
- What valid entries exist for each relevant data element (format and potential values)
- What fields are required versus optional
- How staff should manage required but unknown fields

_____ 6 **Document new processes, distribute agreed-upon standards to all relevant constituents, and store instructions in a centrally accessible location**

Ensure that the following campus members receive a copy:

- All staff responsible for related data entry
- Data custodians or data stewards of the relevant data

_____ 7 **Create accountability mechanisms to ensure high data quality over time**

Potential accountability mechanisms include:

- Automated data quality checks and communication of results to data entry staff
- Department-level data quality scorecards

Example of BI Merchandising Efforts

University of Arizona's Back Pocket Data Sheet

THE UNIVERSITY OF ARIZONA
Student Affairs & Enrollment Management
Academic Initiatives & Student Success

Back Pocket Data 2014

Factors Influencing UA Veteran Student Success
11/14/2014

Findings from the 2014 UA Veteran Student Experience and Engagement Survey illustrate retention strategies that promote persistence among UA student veterans. 34% of veteran student respondents considered withdrawing from UA at least once. Factors leading to the their persistence include the recognition of college investment (50%), staff and faculty support (27%), identified essential funding sources (12%), and family influence and support (11%).

Persistence Factors among UA Veteran Students Considering Withdrawal

50% - Recognition of past financial and time investments in college

27% - Staff and faculty support

12% - Received funding

11% - Family influence and support

Source: 2014 UA Veteran Student Experiences and Engagement Survey (N=127; Response rate = 11.5%)

To view a full summary of the survey findings, please click here.

Source: "Factors Influencing UA Veteran Student Success" University of Arizona (2014); EAB interviews and analysis.

Data Stewardship Coordinator Position Description

From Stanford University, as of March 4, 2015

Position overview:

The Data Stewardship Coordinator (DSC) will report to the Associate Vice Provost of Institutional Research and Decision Support (IRDS). The individual in this position will coordinate Stanford's data stewardship and data governance initiatives. The DSC works with the Business Intelligence Competency Center (BICC) and IRDS, which is the University's principal source of data and analysis on a broad array of institutional topics. This position requires a unique combination of business, database/reporting technology, and interpersonal skills.

The Data Stewardship Coordinator will develop and support data stewardship processes at Stanford, coordinating these issues across subject areas, organizations, reporting platforms, administrative systems, and databases. Working with subject area Stanford University Data Stewardship (SUDS) groups and the SUDS Steering Committee (SUDS-SC), this position is responsible for processes, standards, and best practices around the development of business-oriented data definitions and other metadata. The DSC will take initiative in identifying emerging needs for metadata management processes, structures, training, documentation, and other resources. In partnership with functional areas and project teams, the DSC will also identify and pursue opportunities for improving institutional data quality, integration, and consistency.

Source: "Data Stewardship Coordinator," Stanford University (2015); EAB interviews and analysis.

Principal duties and responsibilities:

- **Coordination and Communication (40%)**
  - Direct, manage, and lead the Stanford University Data Stewardship Steering Committee, comprised of subject area Data Stewards. This will include scheduling meetings, setting agendas, facilitating discussions, tracking and following up on action items, and recording and distributing minutes of the meetings.
  - Support and encourage coordination among subject area Data Stewards to address data and metadata issues that involve multiple functional areas and/or administrative systems.
  - Participate with Data Stewards on specific task forces that are set up for the duration of issue resolution or project-focused tasks.
  - Identify and pursue opportunities to improve the understanding, usage, consistency, and quality of institutional data via program, process, and policy improvements/innovations.
  - Keep up to date on trends and best practices in business intelligence, data governance, and metadata management.
- **Metadata Management (60%)**
  - Coordinate with stakeholders from all areas of the university to improve consistency in the use of shared terms and concepts and the quality of the underlying data.
  - Work with subject area Data Stewards to create, distribute, and maintain institutional metadata. Ensure that definitions of key data elements, entities, hierarchies and business processes are documented, approved by relevant stakeholders, and made broadly available.
  - Using available metadata management tools (primarily Collibra; also Informatica Metadata Manager), take primary responsibility for supporting, designing, and implementing structures to facilitate content development, approval, and dissemination.
  - In collaboration with the Data Stewardship Steering Committee, lead the development and maintenance of standards and best practices for metadata development; support and encourage the adoption of these standards and best practices by subject area Data Stewards.
  - Provide tactical support for Data Stewardship teams and efforts. Serve as a resource for metadata content standards, and for best practices around engaging and communicating with stakeholders, leading discussions, integrating metadata efforts with reporting projects, and scoping/planning new initiatives.
  - Provide a university-wide perspective on metadata, ensuring that content developed by project-specific teams can be reused in other contexts without conflicts or rework.

Source: "Data Stewardship Coordinator," Stanford University (2015); EAB interviews and analysis.

Qualifications

Requires knowledge of relational databases, advanced Excel capabilities, database packages (e.g. MS Access, Brio Query, and Business Objects), and data/metadata management. Requires excellent abilities in written and oral communication, data visualization, time management and multitasking, attention to detail, and the ability to quickly learn new technical tools.

Requires strong interpersonal skills: able to interact with and lead groups of individuals from all backgrounds and levels, and to maintain effective working relationships and negotiate priorities with diverse groups of stakeholders.

Demonstrated ability to organize and present complex information to diverse audiences clearly, accurately, and at appropriate levels of detail. Able to work under pressure on multiple tasks in a timely and accurate manner. Working knowledge of applicable University policies using independent judgment is required.

Required Skills

- **Professional/Technical**
  - Bachelor's degree in an analytical major required such as Computer Science/Business/MIS (or equivalent work experience to substitute for education). Desired: Advanced degree (e.g., MA, MS, JD, PhD) in Math, statistics, decision analysis, computer science (databases), social science.
  - 3-5 years of progressive analytical business experience (e.g. data, reporting and process analysis, developing policies, standards, and processes). Desired 5-7 years of job related experience.
  - Demonstrated superior organizational and analytical abilities required for complex problem solving; ability to provide sound advice to clients with a strong emphasis on and orientation toward internal controls and client service.
  - Understanding of enterprise information and data management principles.
  - Experience managing metadata in a repository or supporting a data management program incorporating data lineage and transformations across systems.
  - Experience with industry leading metadata and data quality tools.
  - Demonstrated ability to communicate and interact with all levels and functions within an organization.
  - Knowledge of data governance industry best practices.
  - Familiarity with reporting and query tools.
  - Solid computer skills with Microsoft applications (Word, Excel, PowerPoint, and Visio).
- **Personal**
  - Strong work ethic, a focus on providing excellent service to customers, and a passion for creating a high-quality organization.
  - Proven interpersonal and coordination skills with the ability to influence and negotiate across all levels of the organization.
  - The ability to work well with those over whom little or no direct control exists.
  - Ability to comfortably work through organization stovepipes to achieve University-wide objectives.
  - Meeting facilitation and presentation.
  - Excellent verbal and written communication skills.
  - Strong planning and organizational skills.
  - Attention to detail.

Source: "Data Stewardship Coordinator," Stanford University (2015); EAB interviews and analysis.

Chief Data Officer Position Description

From the University of Wisconsin, as of January 1, 2015

Position overview:

The University of Wisconsin depends on employees being able to use enterprise system data efficiently to create information that is reliable and useful within and across organizational units, while also maintaining data integrity and security. This position is responsible for designing, creating, and maintaining a service able to meet these needs. This position will be responsible for strategies to harness the data in support of the institutional mission.

Thus this position requires a senior-level executive to shape and lead enterprise-wide information management functions. The position is responsible for the development and execution of governance, architectures, policies, practices, and procedures that properly support the full data lifecycle and analytics needs of the university. This position will work closely with the Chief Information Security Officer to define data security and privacy practices and create a strong data classification scheme. Concerns of this position include, but are not limited to data quality, data security, data governance, data delivery, data storage/archival/retrieval, data access and the transformation of data into useful information. The focus is on UW-Madison, but the performance of these duties will also require close coordination with UW System and its member institutions.

The role will provide the strategic leadership, collaborative coordination, creative problem-solving and administrative authority necessary to achieve mission-critical reforms and advances in data administration and use. Key stakeholders include data stewards and units responsible for official data reporting and analysis on behalf of the university, the leadership in teaching and learning, research, advising, and those representing ancillary systems and data management leaders. The improvements necessary include but are not limited to the development of a distributed system of core competencies and tools to: efficiently translate large and small information sets into data (for example with 'smart' batch upload to translate temporary hires such as teaching assistants into the various enterprise databases that are relevant) stored in the distributed enterprise databases; facilitate the ability of all units on campus to efficiently create reports and summary information from the distributed enterprise databases; and facilitate the ability of all units on campus to translate data into information useful for decision making, from class offerings to student advising to program improvement.

The position is a member of the Office of the Chief Information Officer and reports directly to the Vice Provost for Information Technology/Chief Information Officer. The position has an indirect reporting relationship to the Chief Operating Officer of the Division of Information Technology for the purpose of collaboration and coordination with the architecture and data management staff within the division.

Source: University of Wisconsin; EAB interviews and analysis.

Principal duties:

- Overall campus-wide responsibility for defining and executing organizational information architecture and management strategy. This includes the planning, funding, training, development, integration, deployment, recovery, and evolution functions that are required to effectively and efficiently support the university mission and goals.
- Create a data governance and management system to support, through evidenced-based inquiry, the mission of the University of Wisconsin-Madison.
- Leads the data management function including defining, developing, and sustaining campus-wide data standards and report requirements for the collection, delivery and use of the data and associated systems.
- Establishes and sustains data governance, bringing together concerns of data quality, data management, data policies, business process management, and risk management surrounding the handling of data throughout the university.
- Ensures appropriate metrics for the data information architecture, systems and processes have been identified, that an ongoing assessment process of these metrics is implemented.
- Develops strategies and leads the planning with the architects to create the institutional platforms for data analytics.
- Develops and promotes campus-wide policies and practices to guide data information collection.
- Works closely with the Chief Information Security Officer (CISO) to improve data security and to protect sensitive and restricted data.
- Works closely with the Enterprise Architecture group to ensure a holistic approach and alignment with the campus enterprise architecture goals and objectives.
- Coordinates the data management and technical activity of the Division of Information Technology to ensure support and alignment with the overall university information management and analytics strategy.
- Addresses current and future business data practice problems.
- Establishes optimal communication and coordination with university stakeholders on data management direction, objectives, issues, needs, and developments.
- Defines and promotes training for data systems personnel to provide them with skills necessary to develop and maintain robust and responsive data information services.
- Creates and maintains a distributed system of individuals with the core competencies to facilitate all of the above.
- Establishes and oversees the Campus Data Governance Committee data management advisory council to campus executive leadership. The charge to the committee would include creating a data governance system that manages information as an enterprise asset, developing policies to manage risks, supporting the integration of existing data warehouses insuring data quality and required security, implementing roles and responsibilities for data governance and management.
- Establishes a collaborative and working relationship with the University Records Officer to assure effective and efficient information lifecycle management in accordance with the University-wide Records and Information Management Program and the Generally Accepted Recordkeeping Principles.

Source: University of Wisconsin; EAB interviews and analysis.

Degree and area of specialization:

Bachelor's degree required; graduate degree in relevant discipline strongly preferred.

Minimum number of years and type of relevant work experience:

- 5-10 years in fields or work environments directly involved with enterprise information assets, data management, and information architecture.
- An employment record showing increasingly responsible previous experience related to this position.
- Familiarity with higher education or complex service/regulatory experience preferred.
- Highly desirable experience would be previous experience developing and implementing data analytics solutions in higher education.
- Knowledge of common architectural frameworks and the place of information architecture within those frameworks.
- Comprehensive understanding of data structures, data systems and tools, and related software and data management policies and practices in a complex organizational environment.
- Management or architectural experience in the delivery of large enterprise-wide information management programs.
- Understanding of the role that cloud and open-source technologies can play in delivering solutions at scale.
- An understanding that large organizations have complex, interacting cultures that must be understood in order to be properly served.
- Proven record of effective leadership, including the ability to balance team and individual responsibilities; building teams and consensus; getting things done through others not directly under his/her supervision; effectively dealing with complex problems and challenging individuals and working ethically and with integrity.
- Experience in developing and implementing data analytics solutions in higher education.
- Proven record of effective management, including planning and decision-making, identifying priorities and bringing projects to successful completion in a timely manner; and maintaining a focus on high standards and quality.
- Excellent verbal and written communications skills and demonstrated analytical abilities.
- Nimble, creative, and can-do approach to solving hard problems and overcoming obstacles.

Source: University of Wisconsin; EAB interviews and analysis.

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