From Data to Decisions

Scaling Analytical Capabilities in a Distributed Environment
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Supporting Members in Best Practice Implementation

Resources Available Within Your Membership

This publication is only part of our work to assist members in decision support. Recognizing that ideas seldom speak for themselves, our ambition is to work actively with members of the IT Forum to decide which practices are most relevant for your organization, to accelerate consensus among key constituencies, and to save implementation time.

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Enhancing the User-Friendliness of Self-Service Resources

Problem: Campus members struggle to obtain value from existing analytical resources and inundate Decision Support teams with basic data requests, reducing time available for strategic analysis

- Tactic 1: Institutional Factbook Configurator
- Tactic 2: Pop-Up Data Presentation Prompts
- Tactic 3: Role-Based Recommendation Engine
- Tactic 4: Crowdsourced Report Use Guides
Central decision support teams are often inundated with ad hoc data requests, in part due to skill deficits, data presentation issues, and uncertainty of how to use decision support resources across campus.

With increased emphasis on user experience by vendors, the technical barrier to analytics tool use has never been lower. Nevertheless, skill deficits remain significant for many users. If a campus member cannot determine how to access or analyze the data, central decision support will need to address user requests on an ad hoc basis.

Frustrations with formatting arise because decision support teams often create resources based on data structures, not based on user needs. If a user cannot identify how to get to the data they need, an additional request will be added to the decision support queue.

Further, campus members who attend training sessions on analytics tools often leave without understanding how to apply the tools. These users may be able to access the data but they still require further assistance to convert the data into action.

These hurdles to self-service, while challenging, present opportunities for decision support teams to improve user experience.
Usability of Analytics Tools Gets an F
Self-Service Impossible Without User-Friendly Tools

Data from a 2014 dissertation by Lisa Helmin Foss, the Associate Vice President and Associate Provost in the Office of Strategy, Planning & Effectiveness at St. Cloud State University, presents insights into deans’ and department chairs’ perceptions of analytics tool usability. Unfortunately, these campus members are generally dissatisfied with the analytics tools on their campuses.

Only one-quarter to one-third of surveyed deans and department chairs agreed or strongly agreed that their institutions analytics tools provide data in the right format, make information easy to access, do what users want them to do, are versatile in addressing needs, or are easy to operate. Of the over 200 survey respondents, none strongly agreed with the statement that their institutions’ analytics tools are easy to operate.

Without simplifying ease of operation, decision support teams cannot achieve analytics self-service for their campuses.

Analytics Tool Experience Unsatisfying

Percentage Point Gap of Positive Responses Minus Negative Responses for Deans’ and Department Chairs’ Observations of Data Analytics Tools, 2014

n=215

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<tr>
<th>Percentage</th>
<th>Observation</th>
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<td>(31)</td>
<td>Provide Data in the Right Format</td>
</tr>
<tr>
<td>(37)</td>
<td>Make Information Easy to Access</td>
</tr>
<tr>
<td>(37)</td>
<td>Do What I Want Them to Do</td>
</tr>
<tr>
<td>(38)</td>
<td>Are Versatile in Addressing Needs</td>
</tr>
<tr>
<td>(45)</td>
<td>Are Easy to Operate</td>
</tr>
</tbody>
</table>

Analytics a Chore

"Overall, academic leaders do not find the data analytics tools available to them to be particularly usable... In fact, not a single respondent strongly agreed that their institution’s data analytics tools were easy to operate."

Lisa Helmin Foss
AVP and Associate Provost
Strategy, Planning, and Effectiveness
Saint Cloud State University

Source: Lisa Helmin Foss, "Implementing Data Analytics as an Organizational Innovation in Colleges and Universities," University of Minnesota Digital Conservancy (2014); EAB interviews and analysis.
Tactic 1: Institutional Factbook Configurator

Tactic in Brief

Typical factbooks present key institutional metrics in static tables, which users find hard to navigate and challenging to use for data analysis. An institutional factbook configurator provides a user-friendly and easy-to-navigate way to access and visualize the most basic institutional data. Filters enable campus members to organize data according to their needs rather than what decision support teams believe to be useful, but which is often not.

Problems Addressed

Central decision support teams dedicate an inordinate amount of time responding to ad hoc requests for simple facts and data, which limits time available for strategic data modeling and predictive analytics. Further, campus members struggle to translate data from static data reports into actionable knowledge.

Implementation Guidance

- Institution type: Four-year, private
- Enrollment: 21,700 (14,300 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Small city (Ithaca, New York)
Usability often depends upon how data is presented. If data is not presented in an easily digestible format, campus members will struggle to use them in decision making.

Cornell University historically distributed thick binders with printed tables that provided what Institutional Research identified as the most important metrics for campus—the institutional factbook. When IR moved the factbook online in 1997, they scanned these paper-based tables into an online registry as PDFs, increasing accessibility but not ease of use.

Data consumers on campus struggled to navigate these hierarchical tables. This led to the perception that the university lacked data and that cross-institutional analyses were impossible. To combat these perceptions, in 2012 Cornell University’s IR department decided to transition their institutional factbook from electronic PDFs into an online, configurable factbook using Tableau. One staff member completed the transition in less than one year, with much of the time dedicated to standardizing data elements for longitudinal comparisons.

This shift has enabled campus members to access and query basic institutional metrics without assistance from central decision support.

### Tables of Data Hard to Quickly Understand

*Previous Factbook Efforts at Cornell Ineffective*

- 189 paper tables collected in a three-inch binder
- 189 electronic tables put into an online repository

- Mountains of data
- Easy to access
- Data presented in hard-to-understand tables
- Challenging to do cross-table analysis
- Lacks most combinations people might want to analyze

- Mountains of data
- Easy to access
- Customizable for individual needs
- Easy to interpret data visualizations

Source: EAB interviews and analysis.
Tactic 1: Institutional Factbook Configurator

Self-Service for Basic Facts
Simple Filters Address the Usual Suspects of Data Requests

Before the transition from static factbooks to a factbook configurator, users could browse the data tables to obtain metrics, but this process was time-consuming and users were limited to the data combinations pre-created by IR.

In Cornell’s Student Enrollment workbook, shown above, IR provides users with data filters based on the most common ad hoc requests that IR has historically received, as shown below.

At many institutions, the average backlog for data requests is weeks for even the simplest of data requests. At Cornell, campus members can now get immediate answers to their basic questions without querying decision support staff and waiting for a response.

Simple Filters Based on Common Requests to IR
Enrollment workbook column options include:
- College
- Sex
- Minority
- Race/Ethnicity
- Degree Objective
- Class
- Sector (Endowed/Contract)
- On/Off Campus
- Home State at Matriculation

Source: Cornell University Factbook; EAB interviews and analysis.
Preparing for Unanticipated Questions

High Flexibility in Configuration Enables Campus Self-Service

The institutional factbook configurator’s high degree of flexibility drastically increases its usefulness to campus members compared to the previous static factbook. The flexibility enables users to answer questions unanticipated by IR. For example, if a donor desires to know how many undergraduate students were enrolled at Cornell over the last decade from a specific country, an advancement officer requires only a few clicks within the factbook configurator to answer that question (as seen in the below screenshot).

The visualization of data also makes immediate impressions on users. With only a quick glance at the Student Enrollment workbook, users can quickly assess which countries are sending more students to Cornell than others.

All departments across campus, from student affairs to public relations, benefit from this flexibility. The factbook configurator enables campus members to find simple facts themselves, which frees up decision support staff time.

Drill-Down Functions Provide Access to Answers for Yet-to-Be Asked Questions

Advancement Officer:
“How many undergraduate students have we had over the last decade from Ethiopia?”

Student Affairs VP:
“How does study abroad participation differ based on student race?”

Public Relations Staff:
“What percent of graduate students come from Albany county?”

Source: Cornell University Factbook; EAB interviews and analysis.
From Having Data to Using Data
Enhancing Usability Makes Getting to Knowledge Faster

Providing more intuitive access to basic data has enabled the decision support team at Cornell University to provide answers faster and serve more campus members. This has freed staff time to provide more assistance to campus members about how to use data for decision making.

The IR department went from creating many variations of the same report for each department to providing one primary data visualization portal with self-service filters.

Users no longer have to wait a few days to get answers to basic questions, as they can find answers to many of these questions in a few clicks by using the factbook configurator.

Previously, the basic data not included in the static factbook was only accessible by IR staff. Now, even Cornell’s president and provost use the factbook to quickly pull figures for speeches or presentations.

The factbook configurator does not eliminate queries to the decision support team, but it decreases the number of basic data requests the team receives. Contacts at Cornell report that IR has more time to answer questions better suited to the staff’s expertise—not fact finding, but data analysis.

Slow, Costly Delivery of Basic Facts

- **Wasted IR Staff Time**
  - Create 90 variations of a report for each department

- **Slow User Experience**
  - User emails IR, waits a few days to get an answer

- **Limited User Base**
  - Most IR data only accessible by IR staff

Better Quality at Lower Cost

- **Ease of Self-Service**
  - Create one easy-to-use data visualization platform with filters

- **Immediate Answers**
  - Fewer than five clicks to answer most questions

- **Widespread Access**
  - Even the president and provost are using it

Silence Is Success

“We judge success of the factbook when people stop contacting us with questions the factbook can answer. If my phone is not ringing, that’s great.”

Marin Clarkberg
Director of Institutional Research and Planning
Cornell University

Source: EAB interviews and analysis.
Tactic 1: Institutional Factbook Configurator

Implementation Tip: Increasing Adoption

Accelerating Usage of the Factbook Configurator Across Campus

Decision support at Cornell University actively pushes the factbook configurator to campus members as the go-to resource for data requests.

When decision support staff receive questions the factbook can answer, staff respond with instructions for how the campus member can self-serve in the future. For example, rather than just respond to a request that the percent of faculty at Cornell in the College of Engineering is 4.8%, the decision support staff member will send a screenshot of the workbook page where that data can be found, along with instructions for navigating the workbook, as shown below.

IR Responses to Data Requests Teach Users to Fish for Themselves

“What percent of faculty at Cornell are in the College of Engineering?”

“Have you checked the Factbook? You can find the answer in the ‘Academic Employees’ workbook under the ‘Counts by College’ view. Here’s how to get to the data…”

1. Access the Factbook through the IR website
2. In the "Academic Employees" workbook, go to the "Counts by College" view
3. Select “Faculty” and “Fall 2015” (the definition of faculty is above the table)
4. Use the counts to obtain the percent of faculty in the College of Engineering

Source: Cornell University Factbook; EAB interviews and analysis.
Tactic 2: Pop-Up Data Presentation Prompts

Tactic in Brief
Decision support staff upload narrative text into reports to provide accessible descriptions of the data. Users may hover over visualized data elements to access the descriptive text.

Problems Addressed
Campus members lack data literacy skills to interpret data.

Implementation Guidance
- Institution type: Four-year, private
- Enrollment: 21,700 (14,300 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Small city (Ithaca, New York)
Promoting Data Literacy

Translating Visualizations into Descriptive Text to Avoid Misinterpretations

While users may be able to locate the correct data source for their needs, they may not understand the implications of the data. Central decision support can provide in-report guidance to help campus members comprehend the data.

Users often misinterpret data. These misunderstandings not only misdirect individual decisions but also lead to mistrust in institutional data.

The institutional factbook configurator at Cornell University, profiled in Tactic 1 (pages 30-35), incorporates pop-up data presentation prompts to help promote data literacy. Within the institutional factbook configurator data visualizations, IR staff edit the default text provided by Tableau’s Tooltips to provide more comprehensible text. Users who hover over the data in the visualizations can quickly and easily understand the implications of the data.

Source: Cornell University Factbook; EAB interviews and analysis.

Easy Fix
IR staff edit the default text provided in Tableau’s Tooltips to read more naturally.

One Right Way
20% of Human Ecology students expect that “mastering course material” will be “very difficult”

Easy to Get It Wrong
20% of students who expect that “mastering course material” will be “very difficult” are Human Ecology students
**Tactic 3: Role-Based Recommendation Engine**

**Tactic in Brief**

Business intelligence 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 in two ways:

1. Based on similar data elements in reports those users have viewed; and
2. Reports that campus members in similar roles have viewed.

**Problems Addressed**

Decision support teams create a plethora of reports for different users, overwhelming campus members with options. End users typically view a narrow range of reports and are unsure of what other reports may be applicable to their work.

**Implementation Guidance**

- Institution type: Four-year, public
- Enrollment: 44,800 (30,700 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Seattle, Washington)
Improving Navigation of Analytical Resources

Shifting to a self-service environment requires users to find the data resources most associated with their needs. IT leaders can help users by providing easy navigation tools: simple filters, search mechanisms, and report recommendations.

Often decision support teams build up vast repositories of data resources to help campus members, and most institutions rely on end users to determine for themselves which reports are relevant to their work; however, users often struggle to identify analytical resources to meet their data needs. The University of Washington’s BI portal helps match user needs to existing analytical resources.

First, the portal provides simple filters to let users sort reports by subject area, the department that created the report, the database from which the data is pulled, or the table from which the data is pulled.

Second, the portal tailors report recommendations to users, similar to online shopping experiences and service provider reviews.

These recommendations—based on user-report activity logs and report-report activity linkages—help combat the disconnect that can occur when BI report writers believe they have created resources that will answer users’ questions but end users remain confused about how to get value from BI resources.

### Matching User Needs to Existing Reports

#### Improving Navigation of Analytical Resources

Simple Filters Bring Users to What They Need

- **Subject Area**
  - Academics
  - HR
  - Financial

- **Table**
  - Account Code
  - Actual Distribution
  - Award Status

- **Support Group**
  - Management Accounting
  - Office of Research Information Services
  - Payroll Office

- **Database**
  - General Ledger
  - Data Mart
  - Operational Data Store
  - HRIS

Personalized Recommendations Guide Users to New Data Sources

Finding a Use for Report Activity Logs

- **User-Report Linkages**
- **Report-Report Linkages**

- **Nothing Too Sophisticated Needed to Tailor Recommendations**
  - User and User’s Campus Role
  - First Report Name and Date Generated
  - Second Report Name and Data Generated

Source: “A Common Currency,” EAB (2015); University of Washington, Business Intelligence Portal Guided Tour; EAB interviews and analysis.
Just the Data You Were Looking For

Reports Recommended Based on the User’s Role

The University of Washington directs users to useful reports by recommending them based on their report generation histories. These recommendations are tailored to individual users based on reports that others in similar roles across campus have viewed.

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 according to report activity logs. The algorithm compares this to the reports viewed by campus members in similar roles in order to generate recommendations for additional reports. To obtain access to the BI portal, a user obtains privileges from one of 14 standard roles created by the university’s data management committee.

For example, this process enables a payroll coordinator within the College of Arts and Sciences to receive suggestions informed by the reports that have been viewed by other payroll coordinators across campus.

The algorithms used by the University of Washington to recommend reports can be found in the Implementation Resources section on pages 92-93.

Source: “A Common Currency,” EAB (2015); University of Washington, Business Intelligence Portal Guided Tour; EAB interviews and analysis.

Example reports recommended to user:
• Class List by Curriculum Course Section
• Aid Authorization and Disbursement by Year
• Custom Budget Index Report by Org Code
Tactic 3: Role-Based Recommendation Engine

Users Who Viewed This Report Also Viewed...

Taking Customer Service Inspiration from Major Online Retailers

The second way the University of Washington’s BI portal guides users to relevant reports is providing recommendations within descriptions of individual reports. The algorithm for this function identifies the additional reports viewed in close time proximity with 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.

The University of Washington also assesses how many hours BI staff dedicate to operational tasks compared to strategic initiatives (e.g., ad hoc reporting versus data modeling). Over the last few years, the team has devoted between eight and 15% of their time to operational tasks, an amount significantly lower than most universities. The team’s emphasis on user-friendly interfaces and self-service navigation has helped limit ad hoc requests.

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

Source: “A Common Currency,” EAB (2015); University of Washington, Business Intelligence Portal Guided Tour; EAB interviews and analysis.
Tactic 4: Crowdsourced Report Use Guides

Tactic in Brief
Within a report portal, campus members provide comments on how they use individual reports. Comments inform other campus members on how to use reports for their own decision making.

Problems Addressed
Users struggle to formulate questions to ask of data to identify insights.

Implementation Guidance

- Institution type: Four-year, public
- Enrollment: 44,800 (30,700 undergraduates)
- Carnegie classification: Research university (very high research activity)
- Campus setting: Large city (Seattle, Washington)
Tactic 4: Crowdsourced Report Use Guides

Surfacing Use Cases for Analytical Resources

Answering the Question: “What Can I Even Do with This?”

Even users who are viewing the correct reports for their needs can struggle to identify how to use them well. The University of Washington thus pairs the recommended reports features, profiled in Tactic 3 (pages 38-41), with user feedback to create a virtual BI user group.

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

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

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

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.

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?

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: “A Common Currency,” EAB (2015); University of Washington, Business Intelligence Portal Guided Tour; EAB interviews and analysis.
Move from a Pull to Push Environment

Connecting Consumers to Data, Not Central Decision Support Staff

A lack of usability creates a “pull” environment in which campus members go directly to the decision support team for ad hoc requests. Undisciplined pull climates overburden the decision support team and crowd out its ability to conduct strategic work, such as building out data models or creating predictive analyses.

Progressive institutions have begun transitioning to a “push” environment. In a push environment, users primarily interact with data resources curated by the decision support team for campus members. Decision support staff focus efforts on scalable analytical resources to serve campus needs rather than individual needs. The decrease in ad hoc requests enables decision support teams to focus more of their time and energy on developing a better data repository for self-service.

Focus on Responding to Campus Member Queries

Undisciplined “Pull” Climate

1. Ad Hoc Query
   Campus member requests data from central decision support unit

2. Ad Hoc Response
   Decision support responds to campus member’s one-off request in one-off format

Focus on Building Out Scalable Resources for Self-Service

Scalable “Push” Environment

1. Improved Repository
   Decision support creates a repository of analytical resources; pushes resources to campus members

2. Self-Service
   Campus members pull basic data themselves, reach out to decision support for only complex needs

Source: EAB interviews and analysis.