From Factbook to Dashboard at The University of Texas System

Office of Strategic Initiatives
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May 2013

UT System is a public institution of higher education and is prohibited by law and regulations from endorsing commercial vendors. This presentation is a demonstration of a UT System Electronic Accountability System. Any mention of a specific commercial vendor is not an endorsement by UT System and is for informational purposes only.
• 15 institutions
  • 9 academic institutions
  • 6 health institutions
• 215,606 students (Fall 2012)
  • 75% undergraduate
  • 40% Hispanic
• 48,819 degrees/certificates awarded (AY 2012)
  • 66% undergraduate
  • ~35% of degrees awarded by public universities in Texas
  • ~63% of degrees awarded by public health-related institutions in Texas
• 19,099 faculty, including 7,621 T/TT faculty
• $2.49 billion in research expenditures (FY 2012)
  • 54% federally funded
  • 65% by the health-related institutions
• $13.1 billion in budgeted expenses (FY 2012)
• $17.6 billion in endowments (FY 2011)
Facts and Trends

Annual report (2005-2010)

- Admissions & Financial Aid
- Enrollment
- Persistence, Graduation, & Outcomes
- Degrees
- SCH & FTE Students
- Faculty & Staff
- Research
- Finance
Driving Forces

- Board of Regents
- Chancellor
- State and national trends
- Calls for increased transparency and accountability
- Calls to demonstrate productivity, efficiency, and impact
- Increases in requests from internal and external constituents for more data
- Desire to streamline and automate office operations
Dashboard Overview

• **Purpose: Many**
  - Transparency, Accountability
  - Management Tool
  - “Fact Book”
  - Streamline Data Collection/Distribution Process

• **Audience: Everyone**
  - Internal leadership and staff; campus leadership and staff; government; private industry; media
  - Although available as context, this is NOT intended as a primary source of information for perspective students or their parents
External Requirements

• Public-facing online data reporting tool (no log-in required).

• User-friendly navigation to multiple levels and breakdowns of the data

• Ability to export data/graphs to Excel or PDF

• Web-based custom reporting
Internal Requirements

• Data warehouse that integrates with Business Intelligence tools and scalable
• Streamline current and future data management processes with automation of extract, transform, and load (ETL) steps
• Analyze multiple large datasets and generate tables & graphs for ad hoc querying, and time series analysis
• Conduct simple and/or robust statistical analyses for research briefs and reports
• Tool that integrates with Microsoft Office products to streamline production of written reports
## Product/Vendor Selection

<table>
<thead>
<tr>
<th>Features:</th>
<th>SAS</th>
<th>Cognos</th>
<th>Oracle</th>
<th>Tableau</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data warehouse</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Analytics</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Reporting</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Dashboard</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost*</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Contracts/Licensing</td>
<td>Existing State</td>
<td>Existing State</td>
<td>-</td>
<td>Limited Existing OSI License</td>
</tr>
<tr>
<td>OSI staff expertise</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>
SAS Applications

Enterprise Business Intelligence Environment

• Enterprise Guide 5.1
• Microsoft Add-In for Excel, Word, PowerPoint 5.1
• Management Console 9.3
• Olap Cube Studio 4.3
• Data Integration Studio 4.4
• Dataflux 2.1*
• SAS/ACCESS 9.31
• Information Map Studio 4.31
• BI Dashboard 4.31
• Information Delivery Portal 4.31
• Web Report Studio 4.31

Visual Analytics Environment

• Visual Analytics Hub 6.1
• Visual Analytics Viewer 6.1
• Visual Analytics Explorer 6.1

Dashboard’s Public Tools
Enterprise Business Intelligence

- OLAP cube capability enables in depth drill paths
- Easily allows exporting of all data tables and graphics to Excel or Word
- More of a traditional dashboard configuration

Visual Analytics

- Easier for non-programmers to manipulate/analyze data and create reports (SAS Visual Explorer).
- SAS Mobile BI app enables access to reports from the IPad.
- More visually pleasing than Web Report Studio reports
## Enterprise Business Intelligence (EBI) Environment

<table>
<thead>
<tr>
<th>Environment</th>
<th>Purpose</th>
<th>Server Structure</th>
<th>Behind Firewall</th>
<th>Access</th>
<th>Unit Record Level Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEV</strong></td>
<td>Extraction, Transformation and Load (ETL) processes; De-identification of datasets for promotion; initial staging ground for developing reports, dashboards, and portals; work promoted to TEST for review</td>
<td>1 Windows 2008 R2 x64 server run on vmware</td>
<td>Yes</td>
<td><strong>Strictly Limited</strong> – small number of analysts in the office</td>
<td>Yes. ID information only available to a very limited subset of staff</td>
</tr>
<tr>
<td><strong>TEST</strong></td>
<td>Cleaned datasets; place to develop and run reports &amp; analysis; review reports &amp; dashboards for promotion to PROD</td>
<td>3 Windows 2008 R2 x64 server run on vmware: mid-tier server (JBoss), metadata server, application server</td>
<td>Yes</td>
<td><strong>Limited</strong> – office staff and internal users only</td>
<td>Yes. De-identified</td>
</tr>
<tr>
<td><strong>PROD</strong></td>
<td>Cleaned datasets; finalized reports &amp; dashboards</td>
<td>Windows 2008 R2 x64 server run on vmware: mid-tier server (JBoss), metadata server, application server</td>
<td>No</td>
<td><strong>Open</strong> – public access <strong>Login</strong> (single sign on) – authenticated secure access for authorized users w/ role-based permissions</td>
<td>Yes. De-identified</td>
</tr>
</tbody>
</table>
## Visual Analytics (VA) Environment

<table>
<thead>
<tr>
<th>Purpose</th>
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<th>Behind Firewall</th>
<th>Access</th>
<th>Unit Record Level Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEV</strong></td>
<td>Cleaned datasets; place to develop and run reports &amp; analysis; review reports &amp; dashboards for promotion to PRODUCTION</td>
<td>4 RHEL 6.4 servers: distributed environment with 1 head node and 3 worker nodes.</td>
<td>Yes</td>
<td>Limited – staff of Office of Strategic Initiatives</td>
</tr>
<tr>
<td><strong>PROD</strong></td>
<td>Cleaned datasets; finalized reports.</td>
<td>8 RHEL 6.4 servers: distributed environment with 1 head node and 7 worker nodes.</td>
<td>No</td>
<td>Open – public access Login (single sign on) – authenticated secure access for authorized users w/ role-based permissions</td>
</tr>
</tbody>
</table>
Data Warehouse

- Star schema data model
- Data warehouse drives both EBI and VA environments

EBI environment

Data Warehouse (lives on Samba enabled Network attached storage device)

VA environment
Shibboleth is a SAML based, open source, federated identity management solution that provides single sign on capabilities and an attribute exchange framework across organizational boundaries.

What that means for UT System:

- Users from across the system (each institution has their own separate network infrastructure) can log on to the Dashboard using their institutional network credentials.
- The attribute exchange framework allows us to grant or restrict access based on a particular attribute such as institution, employee status, employee type, etc.
Technical Challenges

• Different operating systems to maintain (Windows and Linux)
• Separate metadata to administer between EBI and VA environments
• There are technical issues unique to the publicly authenticated user identity:
  ▪ does not inherently work with web authentication in SAS
  ▪ not native to SAS Visual Analytics
UT System Productivity Dashboard: An Overview of Dashboard Expansion

Core Indicators
- Student Success: Enrollment, Degree Production, Graduation Rates, Post-Graduation Success
- Faculty Productivity: Workload
- Research Expenditures
- Technology Transfer: Gross Revenue from Intellectual Property
- Healthcare: Net Revenues from Patient Care
- Productivity & Efficiency: Delta Cost per Degree/Cost per FTE
- Endowments

Data displayed in multiple forms: aggregate performance, trends over time, benchmarked performance to peers and/or targets, and closing the gaps for underserved populations.

Topical Dashboards
Each dashboard will contain the measure(s) from the Core Indicators plus additional related metrics, analysis, and related reports/papers.

Student Success
- Access
- Affordability
- Enrollment
- Graduation Success
- Post-Graduation Success
- Graduate Education
- STEM

Faculty Productivity
- Teaching Excellence
- Compensation / Descriptive Metrics
- Research
- Tech Transfer
- Community Engagement / Public Service

Research & Tech Transfer
- Research Excellence & Competitiveness
- Tech Transfer & Commercialization
- Collaboration
- Partnerships
- Areas of Expertise

Finance / Productivity & Efficiency
- Cost Analyses (degrees, students, administration)
- Funding Trends
- External Funding Trends
- Financial Strength
- Space Utilization

Healthcare
- Producing and Retaining Residents and Physicians
- Patient Care
- Revenue and Cost Analyses

Institutional Profiles
- Separate profile (dashboard) for each institution
- Includes institutional data on relevant metrics from Core Indicators and Topical Dashboards
- Other institution-specific analysis, reporting, and data as appropriate
- College- and/or department-level reporting as available

College/Department Profiles
- Information at the college and/or departmental levels as available
- Data from across campuses (i.e., see all engineering schools)

Special Topic / Specific Need Dashboards
Will consolidate metrics around areas of high interest or need. Will offer more in-depth analysis and reporting as needed.

Graduation Success
Focus on student success outcomes measures (e.g., graduation rates) and related input metrics (e.g., developmental ed requirements)

Affordability
Focus on tuition trends, comparisons to peers and averages, financial aid, student debt. Include analysis by income level.

Emerging Research Universities
Examine progress towards Tier 1 and established goals for the 4 UT ERUs. Comparisons to other TX ERUs, peers, benchmarks.

Diversity
Focus on trends in access and outcomes for minority students. Examine trends in STEM and medical fields.

Information Dashboards for Specific Needs
Developed on request to provide data for regular requests from specific constituents. Examples of these requests may include those from investment firms, ratings agencies, venture capitalists, etc.
Dashboard Demo

data.utsystem.edu
exploredata.utsystem.edu
Lessons Learned…So Far

1) Document processes as you go along, especially those that are executed regularly

2) Create a security model for OS and application permission

3) Ensure that big picture is translated into the appropriate detailed steps

4) Participate in training at the optimal point in your process. Too early is ineffective!
5) Accept that you will never have enough time

6) Accept that there will be intermediate steps needed between your data warehouse and analyst end users

7) Anticipate mid-course adjustments on weekly, if not daily, basis
Conclusion: The Benefits

• Easy Access to Information
• Ability to Access Multiple Years of Historical Data
• Standardization of Data Across a Large Higher Education System
• Ability to Answer Complex Questions
• Transparency Results in Better Outcomes
Questions?

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