From Factbook to Dashboard at The University of Texas System

Office of Strategic Initiatives

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May 2013

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UT System By the Numbers

- **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)**

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Facts and Trends
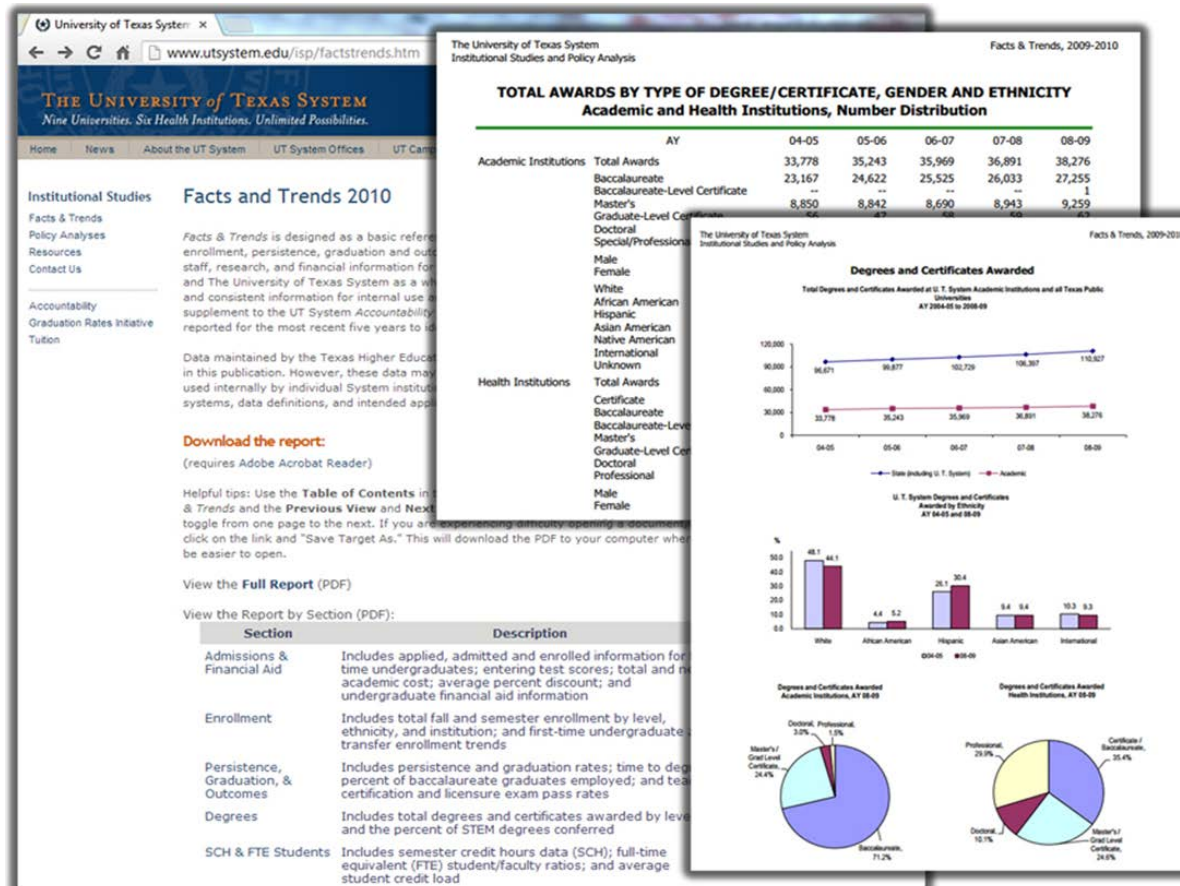
Annual report (2005-2010)

- **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**

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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**

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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**

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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**

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Product/Vendor Selection

	SAS	Cognos	Oracle	Tableau
Features:				
Data warehouse	+	+	+	-
Analytics	+	-	-	+
Reporting	+	+	+	+
Dashboard	+	+		
Cost*	+	-	-	-
Contracts/ Licensing	Existing State	Existing State	-	Limited Existing OSI License
OSI staff expertise	+	-	-	+

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

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SAS Business Intelligence vs. SAS Visual Analytics

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

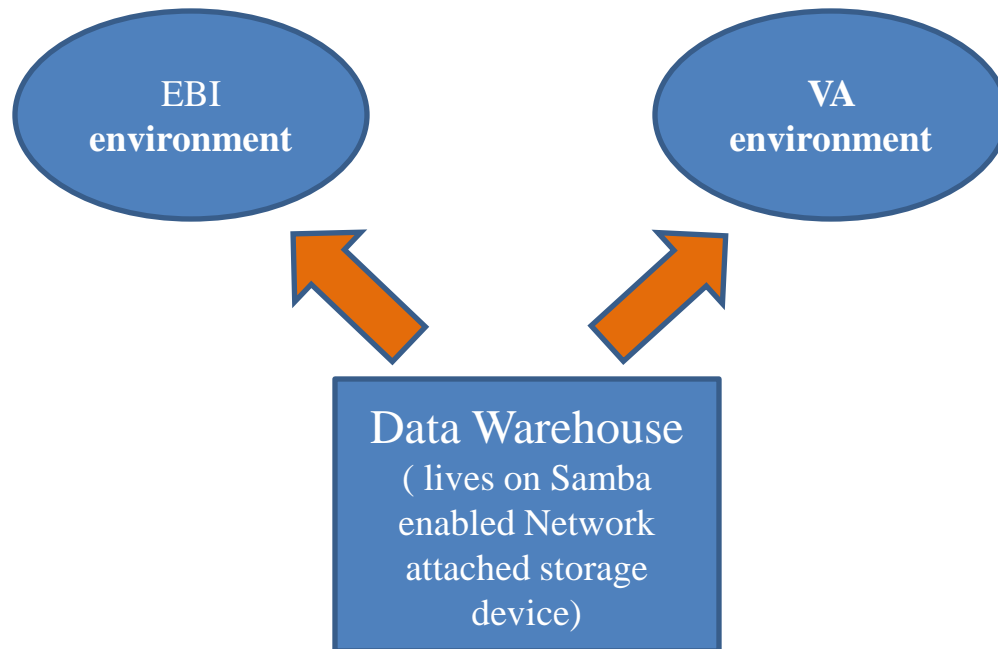|	Purpose	Server Structure	Behind Firewall	Access	Unit Record Level Data
DEV	Extraction, Transformation and Load (ETL) processes; De-identification of datasets for promotion; initial staging ground for developing reports, dashboards, and portals; work promoted to TEST for review	1 Windows 2008 R2 x64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

Visual Analytics (VA) Environment

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

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Data Warehouse

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

EBI environment

VA environment

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

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Federated Identity Management (Shibboleth)

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

Executive Dashboard

10 highest priority indicators (from 5 mission areas) to measure overall System excellence.

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.utsytem.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!

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Lessons Learned…So Far (cont.)

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

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Questions?

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