Tracking Bachelor's Degree Recipient Reenrollment and Subsequent Degrees

Gayle Fink, Assistant Vice President for Institutional Effectiveness

Tim Vlamis, Vlamis Software Solutions

Bowie State University

- 150+ years old

- Oldest Historically Black College and University in Maryland

- Located between Washington DC and Baltimore MD

- Part of the University System of Maryland

- 23 undergraduate, 19 master's, 2 doctoral programs

- Enrollment – over 6,300

  - ~5,400 UNG

  - ~900 GRAD

- Over 1,000 degrees awarded annually
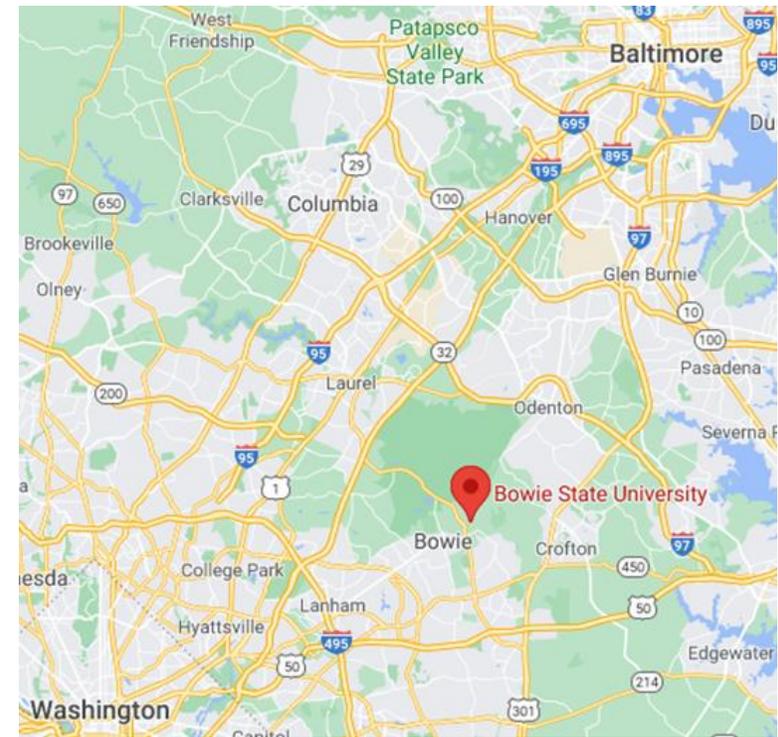
Office of Planning, Analysis and Accountability (OPAA) - What we do
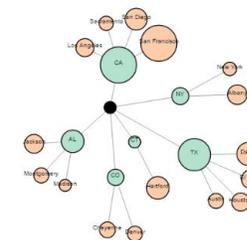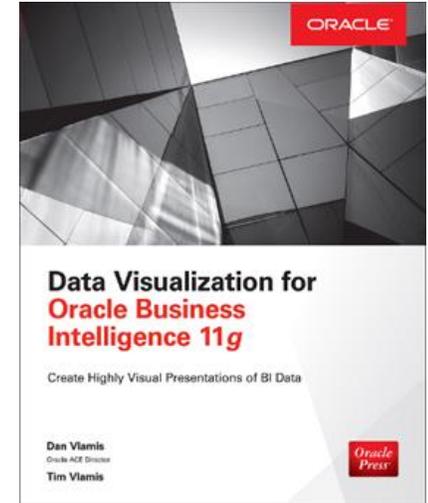
IR Responsibilities:
- Data Reporting (federal, state, system)
- Enrollment analysis
  - Student retention, progression, graduation, student profiles, fact book
- Grade analysis
  - Midterm analysis, success rates, etc
- Surveys
  - **Internal** - entering student, current student, graduating student satisfaction, course evaluations, ad hoc
  - **External** –US News, CUPA, AAUP, VSE, etc
- Enrollment Projections

IE Responsibilities:
- Narrative Reporting (state, system)
- NCAA / USDOE reporting
- Curriculum management
- Accreditation – regional / specialized
- Strategic planning
- Planning & budgeting
- SLO and other assessment activities
- President and Provost projects
- *Data warehouse and Post Graduation outcomes*

Vlamis Software Solutions

- Vlamis Software founded in 1992 in Kansas City, Missouri

- Developed 400+ Oracle BI and analytics systems

- Specializes in Oracle-based:
  - Enterprise Business Intelligence & Analytics
  - Analytic Warehousing
  - Machine Learning and Predictive Analytics
  - Data Visualization
  - ETL and data integration

- Multiple Oracle ACEs, consultants average 15+ years

- Creators of the Force Directed Graph Plugin on Oracle Analytics Library

- www.vlamis.com (blog, papers, newsletters, services)

- Co-authors of book "Data Visualization for OBI 11g"

ORACLE | Service Partner

Expertise in
**Oracle Cloud Platform
Business Analytics**
in North America

Data Visualization for
**Oracle Business
Intelligence 11g**

Create Highly Visual Presentations of BI Data

Dan Vlamis
Oracle ACE Director

Tim Vlamis

ORACLE Press

A | ORACLE
ACE Director

A | ORACLE
ACE Director

vlamis
SOFTWARE SOLUTIONS

Data Warehouse and Post Graduate Outcomes

- BSU Strategic Plan – Objective 3.4
  - Construct an analytics capacity
- Title III HBGI Activity
  - Enhancing Institutional Effectiveness, Academic, and Student Success Through Data Analytics
    - ✓ Phase I – Identifying data warehouse and analytics tools
      - Oracle Autonomous Data Warehouse (ADW) & Oracle Analytics Cloud (OAC)
    - Phase II – Build initial data structures to support academic decision making and student success
      - SOW 1 – Create initial data integrations from Peoplesoft to ADW
      - ✓ SOW 2 – Create data structures for tracking reenrollment of bachelor's degree recipients
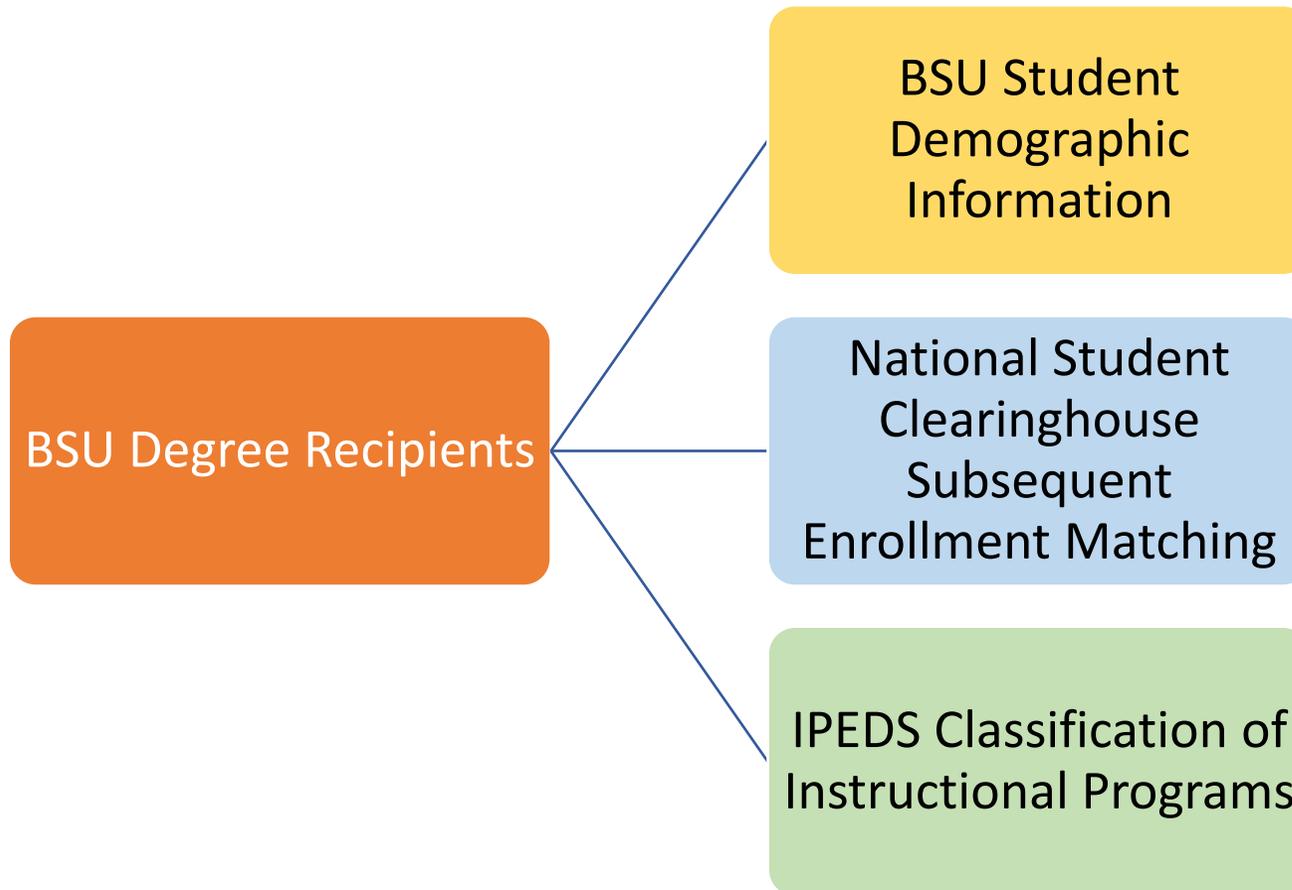
Tracking Re-enrollment of Bachelor's Degree Recipients

- Why
  - Demonstrate effectiveness of BSU's academic programs
    - Post Graduation Reenrollment
    - Post Graduation Earnings (future)
  - Meet programmatic specialized accreditation requirements
  - Create a sustained and accessible data integration and visualization process

Oracle Technologies Involved

- Oracle Autonomous Database (ADB, ADW)
  - Loaded data into ADW via ADW Database Actions ("ADW Tools")
  - Transformed data using SQL Developer – SQL UNPIVOT
- Oracle Analytics Cloud (OAC)
  - Used Data Flows to create hierarchy of codes
  - Used Multi-table dataset to access data directly from ADW
  - Using RPD for enrollment analytics, but not for this postgrad project
- Oracle Data Integrator (ODI)
  - Using for larger analytic warehouse project, but not postgrad

Tracking Reenrollment of Bachelor's Degree Recipients **– Data Sources**

BSU Degree Recipients

- BSU Student Demographic Information
- National Student Clearinghouse Subsequent Enrollment Matching
- IPEDS Classification of Instructional Programs

Data Strategy for Post Grad

- Trade off - **development speed** vs quality
  - Used multi-table data sets rather than RPD
  - RPD development and ADW base model not complete
- Had to consider modeling in ADW vs OAC
- Custom calculations to be done in front end
- Move modeling "down the stack" in the future
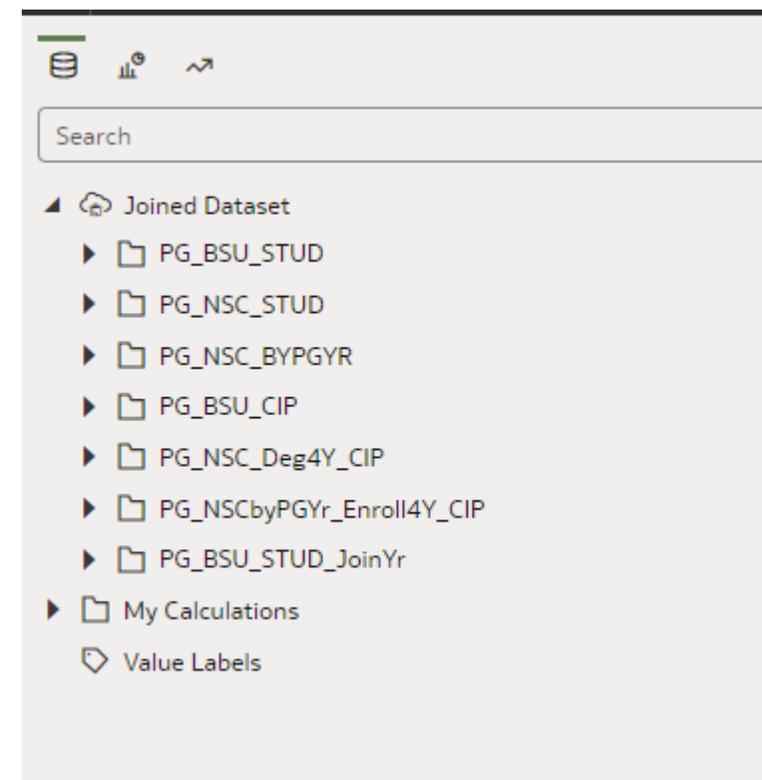
Data Sources – Ad Hoc and Warehouse

- Created summary file for BSU students
- Loaded data into ADW using Database Tools utility
  - Decided to use power of ADW vs OAC data sets
  - 3 major sources – BSU, Clearing House, CIP
- Used staging tables to facilitate unpivot transforms for clearing house data
  - Post grad years 1 – 8 table PG_NSC_byPGYr
  - Creates 8 records per student, one for each year
- Had to clean up and create short titles for CIP data
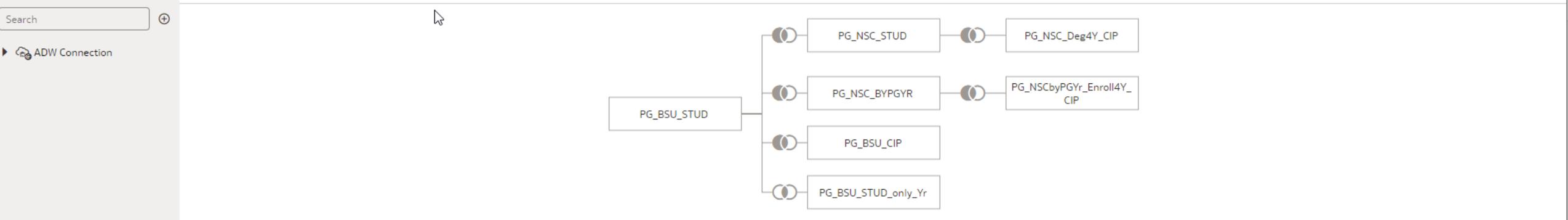
Data Sources – Student Data

- Main Student Table from BSU has one record per student
- Compiled data from PeopleSoft tables

PG_BSU_STUD
- A COLLECTION_TERM
- A COLLECTION_YEAR
- A OPEID
- A LOCAL_CAMPUS_STUDENT_IDENTIFIER
- \# # BSU Students
- DEGREE_DATE
- \# FIELD6
- A DEGREE_SOUGHT
- A PROGRAM_TAXONOMY
- \# CUMULATIVE_GPA
- \# CUMULATIVE_NATIVE_CREDITS_EARNED
- \# CUMULATIVE_DEGREE_CREDITS_HOURS_AWARDED
- A ENTRY_TERM
- A ENTRY_YEAR
- \# CREDIT_HOURS_REQUIRED_TO_EARN_AWARD
- A GENDER
- A US_CITIZENSHIP
- A HISPANIC_LATINO_ETHNICITY
- A WHITE
- A BLACK_AFRICAN_AMERICAN
- A ASIAN
- A AMERICAN_INDIAN_NATIVE_ALASKAN
- A NATIVE_HAWAIIAN_PAC_IS
- DIS_FY_2014_2021L_BIRTHDATE
- A ETH_97
- \# EST_AGE_YR
- A AID_YR
- A DESCR
- A HEGIS
- A PROGRAM_NAME
- A CIP

Data Sources – CIP Codes –Topics of Study

- CIP Codes maintained by IES National Center for Educational Statistics
- Updated in 2010, 2020 "Crosswalk"
- Website listing https://nces.ed.gov/ipeds/cipcode/browse.aspx?y=55
- "There's a code for that."
- Classification of Instructional Programing

Data Munging/blending/mashup/wrangling

- 3rd party syndicated data
  - One file per year
  - Recast and pivot the data
  - Some questions on format
  - EXTREMELY long titles, more than 128 characters
  - Merged records into single file
- Joins
  - Used left outer joins to maintain completeness
- Bowie state definitions vs syndicated
- Basic star – facts and dimensions

```sql
1   CREATE TABLE "STUDENTANALYTICS"."CLEARINGHOUSEYR1"
2     (    "ENTERING_COHORT_YEAR" NUMBER,
3       "REQUESTOR_RETURN_FIELD" VARCHAR2(4000) COLLATE "USING_NLS_COMP",
4       "POST_GRAD_YEAR" NUMBER,
5       "DATE_RANGE" VARCHAR2(4000) COLLATE "USING_NLS_COMP",
6       "School Code/Branch of First Different Two-Year Institution Attended" VARCHAR2(4000) COLLATE "USING_NLS_COMP",
7       "Name of First Different Two-Year Institution Attended" VARCHAR2(4000) COLLATE "USING_NLS_COMP",
8       "Date of First Enrollment at First Different Two-Year Institution" NUMBER,
9       "CIP Code Associated to Enrollment at Different Two-Year Institution" NUMBER
10     )  DEFAULT COLLATION "USING_NLS_COMP" SEGMENT CREATION IMMEDIATE
11    PCTFREE 10 PCTUSED 40 INITRANS 10 MAXTRANS 255
12   COLUMN STORE COMPRESS FOR QUERY HIGH ROW LEVEL LOCKING LOGGING
13    STORAGE(INITIAL 65536 NEXT 1048576 MINEXTENTS 1 MAXEXTENTS 2147483645
14    PCTINCREASE 0 FREELISTS 1 FREELIST GROUPS 1
15    BUFFER_POOL DEFAULT FLASH_CACHE DEFAULT CELL_FLASH_CACHE DEFAULT)
16    TABLESPACE "DATA"
17   as select
18   "ENTERING_COHORT_YEAR",
19       "REQUESTOR_RETURN_FIELD",
20   FROM STUDENTANALYTICS.CLEARINGHOUSE3
21   UNPIVOT (
22       ("DATE_RANGE",
23       "School Code/Branch of First Different Two-Year Institution Attended",
24       "Name of First Different Two-Year Institution Attended",
25       "Date of First Enrollment at First Different Two-Year Institution",
26       "CIP Code Associated to Enrollment at Different Two-Year Institution" )
27       FOR "POST_GRAD_YEAR"
28       IN (
29           ("DATE_RANGE_OF_YEAR_1",
30       "Year 1: School Code/Branch of First Different Two-Year Institution Attended" ,
31       "Year 1: Name of First Different Two-Year Institution Attended",
32       "Year 1: Date of First Enrollment at First Different Two-Year Institution",
33       "Year 1: CIP Code Associated to Enrollment at Different Two-Year Institution"
34   )
35    AS 1,
36           ("DATE_RANGE_OF_YEAR_2",
37       "Year 2: School Code/Branch of First Different Two-Year Institution Attended" ,
38       "Year 2: Name of First Different Two-Year Institution Attended",
39       "Year 2: Date of First Enrollment at First Different Two-Year Institution",
40       "Year 2: CIP Code Associated to Enrollment at Different Two-Year Institution"
41   )
```

Visualizing Data Results

- Challenges of large tables
- Topic visualization and layout
- Summary to detail
- Cross-dimensional analysis

- Demo

Future Work

- Building a foundation for enrollment analysis
  - ADW Data warehouse project in progress
  - OAC dashboards/canvases design in progress
- Many, many other subject areas
  - Degree analysis
  - Class performance
  - Academic progress
  - Student success

Q&A

Gayle Fink - Assistant Vice President for Institutional Effectiveness

gfink@bowiestate.edu

Tim Vlamis – Vlamis Software Solutions

tvlamis@vlamis.com