Benchmarking for a New Era of Leaders With Self-service Dashboards

Presenter: Meghal Parikh
University of Central Florida
Who are we?

• founded in sunny Orlando, FL in 1968
• over 64,000 students
• one of the top public university awarding more Bachelor’s degrees than most public universities in the nation
• plan of new UCF campus at Creative Village to bring 7,700 students to downtown Orlando
• plans for new 100-bed teaching hospital with a public-private partnership with Hospital Corporation of America
• top 30 nationwide for National Merits
AGENDA

Motivation

Developing a Benchmarking Warehouse

Peer Selection Process (an UPDATE!)

Self-service Dashboards

What Next?
Self-service Dashboards

- tool used: Tableau Public
- data source: IPEDS, NSF, NCAA etc.
1. UCF Benchmarking Dashboard

- https://public.tableau.com/views/BenchmarkingDashboard/BenchmarkingDashboard?:embed=y&:display_count=yes
2. University Ranking based on number of degrees awarded in each CIP code

- [https://public.tableau.com/views/UniversityRankingbasedonnumberofdegreesawardedineachCIP/DegreesAwardedbyCIPRanked?:embed=y&display_count=yes](https://public.tableau.com/views/UniversityRankingbasedonnumberofdegreesawardedineachCIP/DegreesAwardedbyCIPRanked?:embed=y&display_count=yes)
What is Benchmarking?

“What Benchmarking is the process of comparing one's business processes and performance metrics to industry bests and/or best practices from other industries.”

• Importance of Benchmarking
  ✓ Analyze present status
  ✓ Find the imperfections
  ✓ Take improvement measures
  ✓ Justify decisions
Benchmarking in Higher Education

- history and background of benchmarking
- industry into higher education
- pioneers: University of Central Florida, Babson College and Penn State
- has been successfully and extensively used in ranking universities
- most comprehensive data availability
- IPEDS, NSF, NCAA, College Scorecard
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What Next?

Motivation
Waves of Change

• a rapidly changing and evolving space, increasingly crowded

• everything is needed – competency based education, global academics, enterprise learning, online learning (and MOOCs)

• performance based funding models

• more emphasis on rankings and badges of honor

• change in the student demographic

• higher expectations, longer relationships with student
IR Office Challenges in Benchmarking

• increase in frequency of ad-hoc requests
• more topic-specific benchmarking studies like salary studies, athletic studies, student debt, research expenditure, higher education productivity etc.
• challenge of using a singular definition for every request
• data collection + visual analysis + QA is very time consuming
• the “add just one more thing” problem

Solution: Benchmarking Data Warehouse

|| Preemptive || Systematic || Singular || Efficient ||
Developing a Benchmarking Warehouse

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What Next?
Data Download and Storage
- IPEDS, NSF, Equity in Athletics Data, Academic Insights, CMUP etc.
- Mostly everything that comes with a UNITID or FICE
- Arrange datasets in proper folders

Importing into Data Prep software
- Eg. SAS Enterprise Guide

Appending multiple years of data
- Easy said than done, beware of the Race changes

Formatting data values with appropriate descriptions

Prepare Data Dictionary

Prepare Aggregated Data
- Add years, data source, merge multiple files if needed, transpose where needed

Creating custom tables and next gen metrics
- Eg. Endowment per age-year

Normalizing data
- rotating tables
Your primary source for information on U.S. colleges, universities, and technical vocational institutions.

Find Your College  Use the Data  Report Your Data
Use the Data
Access IPEDS data submitted to NCES through our data tools or download the data to conduct your research.

**Overview of IPEDS Data**
Get a bird’s eye view of IPEDS data: learn what data are collected and how you can use the various tools on this page to access IPEDS data.

**Data Trends**
Use the Trend Generator to view trends on most frequently asked subject areas including: Enrollment, Completions, Graduation Rates, Employees and Staff, Institutional Revenues, and Financial Aid.

**Look Up an Institution**
Look up information for one institution at a time. Data can be viewed in two forms: institution profile (similar to College Navigator) and reported data (institution’s response to each survey question).

**Data Feedback Report**
Download, print, or customize an institution’s Data Feedback Report, a report that graphically summarizes selected institutional data and

**Compare Institutions**
Download IPEDS data files for more than 7,000 institutions and up to 250 variables. Data files are provided in comma separated value (*.csv) format.

**Survey Data**
Data are available starting with the 1960-81 collection year for the Complete data files and Custom data files functions, which zip the data into comma separated value (*.csv). Beginning with the 2010-11 collection year, data for each collection year are compiled into an Access database.
<table>
<thead>
<tr>
<th>Year</th>
<th>Survey</th>
<th>Title</th>
<th>Data File</th>
<th>Stata Data File</th>
<th>Programs</th>
<th>Dictionary</th>
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<tr>
<td>2015</td>
<td>Institutional Characteristics</td>
<td>Educational offerings, organization, services and athletic associations</td>
<td>IC2015</td>
<td>IC2015_STATA</td>
<td>SPSS, SAS, STATA</td>
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<td>Student charges for academic year programs</td>
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<td>Student charges by program (vocational programs)</td>
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<td>IC2015_PY_STATA</td>
<td>SPSS, SAS, STATA</td>
<td>Dictionary</td>
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</table>
Importing into Data Prep software

Appending multiple years of data

• SAS code provided by IPEDS gives labels to column names and formats to codes making your dataset more friendly
### Prepare Aggregated Data
- Normalizing data
- Creating custom tables and next gen metrics

<table>
<thead>
<tr>
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<th>unitid</th>
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<th>SECTION</th>
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<th>Academic_Level</th>
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<th>EFAIANM</th>
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<td>Graduate</td>
<td>Full-time</td>
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Survey_Year | Data_year | unitid | Acad_Level | FTPT | Degree_S | student_class | Gender | Race | Female_flag | Minority_flag | No_of_students | Source |
Prepare Aggregated Data
Normalizing data
Creating custom tables and next gen metrics

Core Revenues (Total) per FTE
Revenues from tuition and fees per FTE
Revenues from state appropriations per FTE
Instruction expenses per FTE
Research expenses per FTE
Core Expenditures per FTE
Instructional Expense per Credit-hour
Endowment per FTE
Instruction spending per FTE (ACTA)
Administrative spending per FTE (ACTA)

Men Admit Rate
Women Admit Rate
Overall Admit Rate
Men Admission Yield Rate
Women Admission Yield Rate
Full-time Admission Yield Rate
Full-time Men Admission Yield Rate
Full-time Women Admission Yield Rate
Overall Admission Yield Rate
<table>
<thead>
<tr>
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<th>INSTNM</th>
<th>IALIAS</th>
<th>Peer</th>
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<td>Auburn</td>
<td>Aspir. Peer</td>
</tr>
<tr>
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<td>Arizona State University</td>
<td>ASU</td>
<td>Aspir. Peer</td>
</tr>
<tr>
<td>104151</td>
<td>Arizona State University</td>
<td>ASU</td>
<td>UIA</td>
</tr>
<tr>
<td>110671</td>
<td>University of California-Riverside</td>
<td>UC Riverside</td>
<td>UIA</td>
</tr>
<tr>
<td>122409</td>
<td>San Diego State University</td>
<td>SDSU</td>
<td>Comp. Peer</td>
</tr>
<tr>
<td>126614</td>
<td>University of Colorado Boulder</td>
<td>U of Colorado</td>
<td>Aspir. Peer</td>
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<tr>
<td>129020</td>
<td>University of Connecticut</td>
<td>UConn</td>
<td>American Athletic Conference</td>
</tr>
<tr>
<td>130943</td>
<td>University of Delaware</td>
<td>UD</td>
<td>Comp. Peer</td>
</tr>
<tr>
<td>132903</td>
<td>University of Central Florida</td>
<td>UCF</td>
<td>American Athletic Conference</td>
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<tr>
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<td>UCF</td>
<td>Aspir. Peer</td>
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<td>UCF</td>
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</tr>
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<td>SUS</td>
</tr>
<tr>
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<td>University of Central Florida</td>
<td>UCF</td>
<td>UIA</td>
</tr>
<tr>
<td>133650</td>
<td>Florida Agricultural and Mechano...</td>
<td>FAMU</td>
<td>SUS</td>
</tr>
<tr>
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<td>FAU</td>
<td>Comp. Peer</td>
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<tr>
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</tr>
<tr>
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<td>Comp. Peer</td>
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<td>SUS</td>
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</tbody>
</table>
Motivation

Developing a Benchmarking Warehouse

Peer Selection Process (an UPDATE!)

Self-service Dashboards

What Next?
Performance Benchmarking at UCF

peers
(selected institutions)

measures
(selected metrics)

performance measurement

Comparison

• internally – benchmark key metrics to set goals and develop strategic plan
• externally – how we present ourselves to the world
• goal: develop two lists based on similarity to UCF and targeted improvement metrics
A Hybrid Approach to Select Peers

• “The role of the institutional researcher is to bring analytical rigor to an otherwise politically charged context” (Ingram, 1995)

• statistics and judgment

• IR office uses **CLUSTER ANALYSIS** to classify universities into groups

• statistical procedure output:
  • our closest neighbors (comparison peers)
  • next set of closest neighbors (potentially aspirational)

• **judgment** needed to determine which potentially aspirational institutions provide good targets for UCF

• data visualizations very helpful

• 7 steps were conducted to come up with a list of 36 important variables for performing cluster analysis and shortlisting 41 schools to compare with UCF

• **Step 1**: Only considered 297 institutions with Carnegie Basic Classification 2010 = "Doctoral/Research" OR "High Research Activity" OR "Very High Research Activity"

• **Step 2**: Variable Selection: 36 variables were shortlisted from 128 variables (ratios) collected based on statistical significance in areas of Institutional Characteristics, Faculty Characteristics, Financial Characteristics, Student Enrollment Characteristics, and Student Degrees and Graduation Rate Characteristics
Peer Selection Process (contd.)

- **Step 3**: Filtering 217 Institutions with Total Enrollment more than 10,000 only (judgment)

- **Step 4**: Cluster Analysis in SAS: using “proc fastclus” (k-means algorithm) and “proc cluster” (Ward's Minimum Variance Method) procedures, we find 41 peer institutions in multiple runs

- **Step 5**: closeness index is created to aid selection process

- **Step 6**: Interactive radar charts in Microsoft Excel and a tree diagram (dendogram) are drawn from the statistical results for easy interpretation
### Financial Characteristics

The chart illustrates various financial characteristics of two institutions, University of Central Florida and University of South Florida Main Campus. The chart includes parameters such as Endowment per Year, Tuition/fees as a % of Core Rev, Instructional Costs per FTE, Instruction Expenses per FTE, Tuition Rev per FTE, Instruction Exp as a % of Core Exp, Cost per Credit Hour, Core Expenditures per FTE, and Endowment per FTE.

#### Table of Values

<table>
<thead>
<tr>
<th>Values</th>
<th>University of Central Florida</th>
<th>University of South Florida Main Campus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endowment per Year</td>
<td>$2,676,547</td>
<td>$5,831,632</td>
</tr>
<tr>
<td>Tuition/fees as a % of Core Rev</td>
<td>35%</td>
<td>24%</td>
</tr>
<tr>
<td>Instruction Exp as a % of Core Exp</td>
<td>38%</td>
<td>30%</td>
</tr>
<tr>
<td>Core Revenue per FTE</td>
<td>$14,357</td>
<td>$24,854</td>
</tr>
<tr>
<td>Tuition Revenue per FTE</td>
<td>$5,089</td>
<td>$5,983</td>
</tr>
<tr>
<td>Instruction Expenses per FTE</td>
<td>$5,403</td>
<td>$8,322</td>
</tr>
<tr>
<td>Core Expenditures per FTE</td>
<td>$14,052</td>
<td>$28,099</td>
</tr>
<tr>
<td>Endowment per FTE</td>
<td>$2,587</td>
<td>$9,188</td>
</tr>
<tr>
<td>Cost per Credit Hour</td>
<td>$185</td>
<td>$291</td>
</tr>
<tr>
<td>Instructional Costs per FTE Instr Staff</td>
<td>$199,577</td>
<td>$146,615</td>
</tr>
<tr>
<td>Annual Giving</td>
<td>$14,858</td>
<td>$43,613</td>
</tr>
</tbody>
</table>

* Indicates Current Comparison Peers
+ Indicates Current Aspirational Peers
* Indicates Variables Not Used in Cluster Analysis

### Institutions

- University of Central Florida
- University of South Florida
- Arizona State University
- Florida State University
- George Mason University
- Stony Brook University
- SUNY at Albany
- The University of Texas at Dallas
- University of Illinois at Chicago
- University of Maryland-Baltimore
- University of Massachusetts
- Florida Atlantic University
- Florida International University
- Georgia State University
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Motivation

What Next?
Benefits

• highly efficient and intuitive way of providing decision-making support
• gives IR team a break from reporting on things
• provides a single version of truth
• prevents mistakes due to fatigue
• ease of sharing
• leaves time for deep-dive analysis (example)
AGENDA

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What Next?
The Future is Here…

• implementing a benchmarking data warehouse has stimulated the creation of multiple interactive dashboards which serve as a self-service stop for leadership to conduct comparative analyses

• more topic-specific benchmarking studies; ranking investigations

• more dashboards like a one-to-one institution comparison dashboard

• providing more efficiency, quicker turn-around times and easy edits

• additional elements to the business process

• additional data sources to the data warehouse
Thank You!!!
Questions?
Select one or more 2 digit, 4 digit or 6 digit CIP codes to see who awarded the highest number of degrees in the selected field. Schools are colored based on the region they are located in (look at adjacent legend). Additional school filters on the left include: academic year when degree was awarded, degree level, region. Carnegie Classification (2015), public/private school, degree of urbanization around the school, whether it grants a medical degree, and size of the school based on latest Fall enrollments.

* Please note, number of degrees includes both first and second majors awarded.

---

### University Ranking based on number of degrees awarded in each CIP code

**Select Data Years to Include:**
- 2014-2015

**Degree Level**
- All

**Select Region**
- U.S. Regions: All
- Public or Private Institutional Control: Public
- School located in City?: Yes
- School grants medical degree?: Yes
- School Size (Enrollments): All

---

**Rank** | **Inst. Name** | **Degrees Awarded**
--- | --- | ---
1 | University of Central Florida | 15,464
2 | Ohio State University-Main Campus | 15,300
3 | Texas A & M University-College Station | 14,647
4 | University of California-Los Angeles | 14,341
5 | University of Illinois at Urbana-Champaign | 14,070
6 | University of Michigan-Ann Arbor | 14,065
7 | University of Michigan-Dearborn | 13,521
8 | University of Minnesota-Twin Cities | 13,344
9 | University of Georgia | 13,041
10 | University of Wisconsin-Madison | 13,022
11 | University of California-Berkeley | 12,993
12 | University of Southern California | 12,679
13 | Georgia State University | 12,729
14 | University of Florida | 12,574
15 | University of Southern California | 12,406
16 | Florida International University | 12,067
17 | University of North Carolina-Chapel Hill | 11,669
18 | University of California-Davis | 11,641
19 | University of California-Davis | 11,641
20 | University of California-Davis | 11,641

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*Shelley Krause* @butwait

Up & @’em, Tweeple! This @Tableau viz is making my geeky little college counselor heart sing. Meghal Parikh FTW!

*Jon Boeckenstedt* @JonBoeckenstedt

Meghal Parikh at UCF did an amazingly comprehensive @Tableau viz of degrees awarded by major over time. #EMChat public.tableau.com/profile/meghs...
Please remember to submit your evaluation for this session through the MyForum app