A Multi-Phase Approach for Identifying University "Organizational Peers" Using Cluster Analysis

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Overview

- What are “organizational peers”?
- UCF Mission and Vision
- What is a Metropolitan Research University?
- Overview of multi-phase approach and cluster analysis
- UCF case study
  - Institutions to be considered
  - Selection variables
  - Methods used
  - Results

The University of Central Florida

- Established in 1963 in Orlando, Florida: Metropolitan Research University
- Grown from 1,948 to 39,000 students in 39 years
  - 32,500 undergraduates and 6,500 graduates
- Doctoral intensive
  - 76 Bachelors, 57 Masters, 3 Specialist, and 19 PhD programs
- Second largest undergraduate enrollment in state
- Approximately 1,000+ faculty and 3500 staff
- Six colleges and two schools
  - Arts and Sciences, Business Administration, Education, Engineering and Computer Science, Health and Public Affairs, Honors, Optics, and Hospitality Management

Revised UCF Mission (2002)

- The University of Central Florida is a public multi-campus metropolitan research university, dedicated to serving its surrounding communities with their diverse and expanding populations, technological corridors, and international partners.
- The mission of the university is to
  - offer high quality undergraduate and graduate education, student development, and continuing education;
  - conduct research and creative activities; and
  - provide services that enhance the intellectual, cultural, environmental, and economic development of the metropolitan region, address national and international issues in key areas, establish UCF as a major presence, and contribute to the global community.

New UCF Vision

- The University of Central Florida will be the nation's ***leading metropolitan research university*** recognized for its intellectual, cultural, technological, and professional contributions and renowned for its outstanding programs and partnerships

What is an Organizational Peer?

- Peer
  - "Equal to another in abilities, qualifications …"
  - "Something of equal worth or quality"
- Organizational peer
  - Comparable organization
  - How to determine?
- Aspirational peer
  - Organization that is a goal or objective to become like
- University organizational peer
  - Considers university as a whole
  - Not program or discipline

In Search of Peers—General Approach

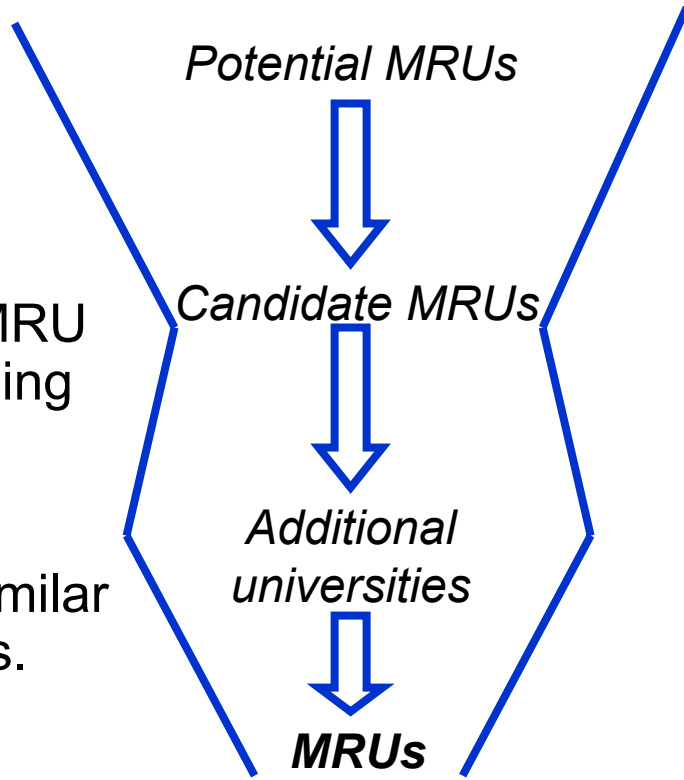
- Focus on identifying potential MRU "comparable peers"
  - Metropolitan and research focus
  - Similar characteristics to UCF
- Identify data feasibility and sources
- Identify related efforts
  - Coalition of Urban and Metropolitan Universities (CUMU)
  - Portraits of Universities with Metropolitan Alliances (PUMA)
- Initial data collection
  - Sort, organize, and assess consistency and availability
- Quantitative analysis—cluster analysis
- Evaluation
- Further analysis and synthesis

Why Did We Look at this Issue?

- Strategic planning discussions (SPC and focus groups)
  - Revised UCF Mission with clearly established UCF VISION
- Led to the basic questions:
  - What is a Metropolitan Research University?
  - To which universities do we compare UCF?
    - Dimensions: Metropolitan and Research
  - How will we know when UCF is the **Leading** Metropolitan Research University?
  - What measures do we use?
    - Mission related
    - Performance focus
- Focus on IDENTIFYING metropolitan research universities

Multi-Phase Structure

- Initial Identification
  - Qualitative identification of potential metropolitan research universities
- Aggregation and screening
  - Quantitative evaluation of potential MRU to define class of institutions comprising MRU
- Refinement
  - Classify set of MRU institutions as similar peers, other peers, and remote peers.
- Follow-on
  - Repeat refinement phase with updated data and additional institutions



Methodology—Cluster Analysis

- Multivariate statistical procedure used as an exploratory data analysis tool
- Partitions a set of objects into relatively homogeneous subsets based on inter-object similarities and between group differences
  - Universities group into clusters with
    - minimal differences between pairs of universities in a cluster
    - maximum differences between the clusters
- Many different algorithmic approaches each resulting in a different view of the data
- All use some notion of a “distance metric”

Two Primary Approaches

- Mutually exclusive clustering (or partitioning methods)
  - You specify number of clusters
  - The algorithm assigns initial cluster centers
  - The algorithm assigns objects to the “nearest” center
  - The algorithm iteratively tries to reduce within cluster distances and increase distance between cluster centers

- Hierarchical clustering methods
  - You specify distance measure
  - The algorithm finds “closest” pair of objects and combines to form a cluster and repeats.
  - Clusters formed in later stages include previous clusters

Mutually Exclusive Cluster Approach

- Iteratively reduces within cluster distances and increases distance between cluster centers
- SPSS includes K-Means Clustering
  - Allows for missing data and good at handling larger data sets
- Used in screening, refinement, and follow-up phases
  - Variable selection
    - Number of variables included in analysis had to be reduced from the original 80 variables collected (number of variables must be less than the number of institutions analyzed)
  - Multiple analyses conducted using different number of clusters
  - Wanted final member cluster size not to exceed 25
  - Reviewed results using different number of clusters

Sample Output: Cluster Membership

Cluster Membership

Case Number	VARIABLE Variable Label	Cluster	Distance
1	Old Dominion Univ.	1	2.228
2	Univ. of Nevada at Las Vegas	1	2.242
3	Univ. of South Florida	2	2.446
4	Georgia State Univ.	1	2.351
5	Univ. of Wisconsin, Milwaukee	1	2.113
6	Univ. of Cincinnati-Main Campus	4	2.361
7	San Diego State Univ.	1	1.968
8	State Univ. of New York, Albany	1	3.366
9	Univ. of Alabama at Birmingham	2	4.549
10	Univ. of Louisville	2	2.136
11	Florida Atlantic Univ.	1	1.997
12	Florida International Univ.	1	1.363
13	Cleveland State Univ.	1	2.493
14	Portland State Univ.	1	1.628
15	Univ. of Missouri at St.Louis	1	3.162
16	Univ. of Texas- Arlington	1	1.743
17	Univ. of Central Florida	1	1.884
18	George Mason Univ.	1	2.437
19	Indiana Univ. - Purdue Univ. at Indianapolis	2	2.948
20	Kent State Univ.	1	2.397
21	North Carolina State Univ.	4	2.046
22	Univ. of Delaware	3	.000
23	Univ. of North Carolina at Charlotte	1	1.764
24	Univ. of North Texas	1	2.736
25	Virginia Commonwealth Univ.	2	1.821
26	Wayne State Univ.	4	2.579
27	Western Michigan Univ.	1	3.605
28	Wright St. Univ.	1	2.709

Sample Output: Cluster Centers

Distances between Final Cluster Centers

Cluster	1	2	3	4	5
1		5.344	6.739	6.678	2.423
2	5.344		6.951	6.677	4.861
3	6.739	6.951		8.286	7.532
4	6.678	6.677	8.286		6.134
5	2.423	4.861	7.532	6.134	

Sample Output: ANOVA

ANOVA

	Cluster Mean Square	df	Error Mean Square	df	F	Sig.
ZUGTOGRH Zscore: Ratio of UG to GR headcount	1.757	3	.905	24	1.941	.150
ZFTTOPTE Zscore: Ratio of full time to part time	6.709	3	.286	24	23.429	.000
ZUGDTOUG Zscore: Ratio of UG degrees awarded to	3.142	3	.732	24	4.290	.015
ZGRDTOGR Zscore: Ratio of GR degrees awarded to	1.111	3	.986	24	1.127	.358
ZUGPROAW Zscore: Bachelors Programs Awarded degr	1.355	3	.956	24	1.418	.262
ZGRPROAW Zscore: Masters Programs Awarded degree	4.281	3	.590	24	7.258	.001
ZDOPROAW Zscore: Doctoral Programs Awarded degre	4.441	3	.570	24	7.793	.001
ZFTFACUL Zscore: Full time faculty	7.804	3	.150	24	52.182	.000
ZEXP_STU Zscore: Expenditure per student	3.594	3	.676	24	5.318	.006
ZRD_FUND Zscore: Total R & D funds	6.735	3	.283	24	23.794	.000
ZENDOWME Zscore: Ending market value of endowmen	6.063	3	.367	24	16.516	.000
ZPUB_FTF Zscore: Publications per Full Time Facu	4.757	3	.530	24	8.970	.000

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

Method We Used to Combine Multiple K-means Results

	28/12/non	28/12/alpha	28/13/alpha	28/13/non	28/21/alpha	28/21/non	Sum
• University of Central Florida							
• University of Wisconsin, Milwaukee	8	7	7	7	7	7	43
• University of Nevada at Las Vegas	7	6	7	7	7	7	41
• Florida International University	8	7	7	7	5	6	40
• University of North Carolina at Charlotte	8	7	7	7	5	6	40
• Florida Atlantic University	7	6	7	7	6	6	39
• Old Dominion University	7	6	6	5	6	6	36
• Portland State University	7	6	6	5	6	6	36
• University of Texas-Arlington	7	6	6	5	6	6	36
• University of Missouri at St. Louis	6	5	6	6	6	6	35
• Cleveland State University	7	5	5	4	6	6	33
• Kent State University	5	5	5	6	5	5	31
• San Diego State University	6	5	5	6	5	3	30
• Western Michigan University	5	5	5	6	4	3	28
• University of North Texas	5	5	5	6	3	3	27
• Wright St. University	5	5	4	4	3	3	24
• George Mason University	4	4	4	4	2	2	20
• State University of New York, Albany	4	3	4	4	3	2	20
• Georgia State University	4	4	4	4	1	2	19
• University of Louisville	2	3	3	2	4	3	17
• Indiana University – Purdue University	2	3	2	2	3	2	14
• Virginia Commonwealth University	2	3	2	2	1	1	11
• University of South Florida	2	2	1	1	2	2	10
• Wayne State University	0	0	1	0	2	1	4
• University of Alabama at Birmingham	1	1	1	0	0	0	3
• University of Delaware	0	0	0	1	1	0	2
• North Carolina State University	1	0	0	0	0	0	1
• University of Cincinnati – Main Campus	0	0	0	0	0	0	0

Hierarchical Clustering Approach

- Finds “closest” pair of objects and combines to form a cluster and repeats
- In SPSS
  - Analyst specifies distance measure
    - Squared Euclidean distance frequently used
  - Analyst specifies linking method
    - Between-groups, Wards’s method, nearest neighbor, furthest neighbor
  - Eliminates institutions with any missing data
  - Standardizes variables
    - Use multiple methods
- Used only in refinement and follow-up phases

Sample Output: Proximity Matrix

Proximity Matrix

Case	Squared Euclidean Distance						
	1:Univ. of Central Flo	2:Florida Atlantic Uni	3:Florida Internationa	4:Univ. of South Flori	5:Cleveland State Univ	6:George Mason	7:Georgia State Univ.
1:Univ. of Central Flo		.158	.229	1.141	1.182	.968	1.072
2:Florida Atlantic Uni	.158		.335	1.397	.798	.821	1.109
3:Florida Internationa	.229	.335		.971	.878	.869	.576
4:Univ. of South Flori	1.141	1.397	.971		1.910	1.458	1.039
5:Cleveland State Univ	1.182	.798	.878	1.910		.407	.925
6:George Mason Univ.	.968	.821	.869	1.458	.407		.555
7:Georgia State Univ.	1.072	1.109	.576	1.039	.925	.555	
8:Indiana Univ. - Purd	1.867	1.693	1.627	1.246	1.640	2.271	2.116
9:Kent State Univ.	.654	.931	.375	1.380	1.349	1.183	.490
10:North Carolina State	2.930	3.418	2.625	1.275	3.996	3.532	2.140
11:Old Dominion Univ.	1.015	.700	.852	1.570	.137	.213	.701
12:Portland State Univ.	.798	.575	.499	1.354	.189	.406	.569
13:San Diego State Univ	.125	.346	.289	.955	1.133	.689	.844
14:State Univ. of New Y	1.294	1.418	1.182	1.732	1.382	.725	.619
15:Univ. of Alabama at	2.760	3.005	2.561	1.782	2.933	2.283	2.127
16:Univ. of Cincinnati-	3.393	3.759	2.861	1.359	4.124	3.883	2.426
17:Univ. of Delaware	2.015	2.698	2.440	2.777	4.113	3.403	2.994
18:Univ. of Louisville	1.370	1.226	.889	.784	.763	1.033	.794
19:Univ. of Missouri at	.778	.381	.742	2.392	.698	1.288	1.671
20:Univ. of Nevada at L	.554	.399	.464	1.417	.523	1.030	1.143
21:Univ. of North Carol	.205	.175	.226	1.586	.832	1.028	1.128
22:Univ. of North Texas	.989	1.157	.561	1.163	1.417	1.406	.483
23:Univ. of Texas- Arli	.587	.440	.557	1.266	.585	.444	.457
24:Univ. of Wisconsin,	.535	.574	.272	1.593	.743	.940	.805
25:Virginia Commonwealt	1.314	1.298	.862	.482	.947	.853	.612
26:Wayne State Univ.	2.932	3.335	1.966	1.264	2.849	2.428	1.121
27:Western Michigan Uni	.741	1.154	.611	1.424	1.511	1.466	1.080
28:Wright St. Univ.	.829	1.082	.403	1.547	1.136	.993	.724

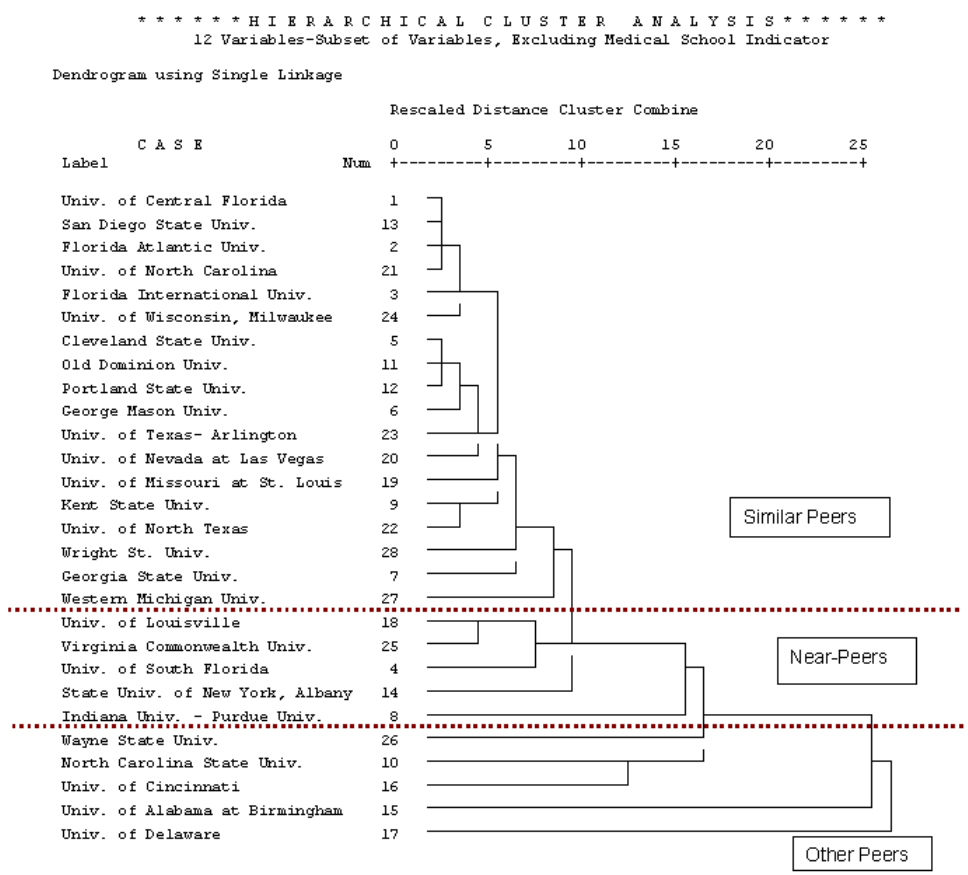
This is a dissimilarity matrix

Sample Output: Agglomeration Schedule

Agglomeration Schedule

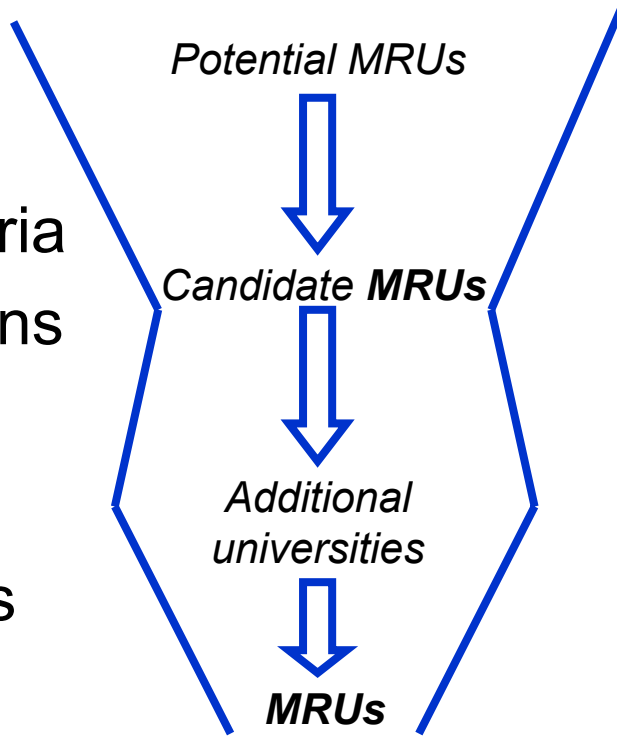
Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	1	13	.125	0	0	4
2	5	11	.137	0	0	3
3	5	12	.142	2	0	7
4	1	2	.158	1	0	5
5	1	21	.175	4	0	8
6	9	22	.204	0	0	15
7	5	6	.213	3	0	10
8	1	3	.226	5	0	9
9	1	24	.238	8	0	13
10	5	23	.276	7	0	12
11	18	25	.298	0	0	18
12	5	20	.325	10	0	13
13	1	5	.330	9	12	14
14	1	19	.357	13	0	15
15	1	9	.375	14	6	16
16	1	28	.403	15	0	17
17	1	7	.457	16	0	19
18	4	18	.482	0	11	20
19	1	27	.552	17	0	20
20	1	4	.612	19	18	21
21	1	14	.619	20	0	23
22	10	16	.844	0	0	25
23	1	8	1.055	21	0	24
24	1	26	1.067	23	0	25
25	1	10	1.070	24	22	26
26	1	15	1.674	25	0	27
27	1	17	1.800	26	0	0

Representative Dendrogram



UCF Case Study

- Start with existing peers
- Identify large pool of candidates
- Identify relevant data to use as criteria
- Screening of variables and institutions
- Refine criteria
- Consider additional institutions
- Identify most similar university peers
- Repeat process until satisfied



Existing UCF Peer Institutions

- George Mason University
- Georgia State University
- San Diego State University
- State University of New York, Albany
- University of Delaware
- University of Houston System
- University of Louisville
- University of Wisconsin--Milwaukee
- Wayne State University
- Western Michigan University

Are these the right ones?

Coalition of Urban and Metropolitan Universities (CUMU)

- **Boise State U**
- Brooklyn College –
- The City U of New York
- California State U - Fresno
- **California State U - Hayward**
- **California State U - Sacramento**
- California State U - San Bernardino
- **Cleveland State U**
- **Eastern Michigan U**
- **Florida Atlantic U**
- **Florida International U**
- **Georgia State U**
- Hunter College,
- The City U of New York
- Indiana U Northwest
- **Indiana U - Purdue**
- Kean U
- Kennesaw State U
- Metropolitan State U – Denver
- Northern Kentucky U
- **Oakland U**
- **Pace U**
- **Portland State U**
- Purdue U - Calumet
- **San Jose State U**
- Simon Fraser U - International Affiliate
- **Southern Illinois U - Edwardsville**
- Southwest Missouri State U
- Southwest Texas State U
- Towson U
- U of Alaska at Anchorage
- U of Arkansas at Little Rock
- **U of Central Florida**
- U of Central Oklahoma
- **U of Houston - Downtown**
- **U of Houston System**
- **U of Illinois at Chicago**
- **U of Louisville**
- **U of Maryland College Park**
- U of Maryland System
- **U of Massachusetts at Boston**
- **U of Missouri - Kansas City**
- **U of Missouri - St. Louis**
- **U of Nebraska at Omaha**
- **U of Nevada - Las Vegas**
- **U of North Carolina at Charlotte**
- **U of North Carolina at Greensboro**
- **U of North Florida**
- **U of North Texas**
- **U of South Carolina - Spartanburg**
- **U of South Florida**
- **U of Tennessee at Chattanooga**
- **U of Texas at San Antonio**
- U of Western Sydney-Nepean - International Affiliate
- **Virginia Commonwealth U**
- Washburn U
- **Washington State U- Spokane**
- **Washington State U- Vancouver**
- **Wright State U**
- York U - International Affiliate

Schools analyzed in boldface

PUMA Universities

CUMU

- **Boise State U**
- Brooklyn College – The City U of New York
- California State University, Fresno
- **Eastern Michigan U**
- Hunter College, The City U of New York
- Kennesaw State U
- Northern Kentucky U
- **Oakland U**
- **San Diego State U**
- **Southern Illinois U - Edwardsville**
- Southwest Missouri State U
- Towson U
- U of Alaska at Anchorage
- **U of Central Florida**
- U of Colorado, Colorado Springs
- **U of Houston – Downtown**
- **U of Nebraska, Omaha**
- **U of North Texas**
- **U of Tennessee at Chattanooga**
- **U of Texas at San Antonio**
- Washburn U
- **Wichita State U**

PUMA Urban 13/21

- **Cleveland State U**
- **Georgia State U**
- **Indiana U - Purdue U Indianapolis**
- **Portland State U**
- Temple U
- **U of Alabama, Birmingham**
- **U of Houston**
- **U of Illinois at Chicago**
- **U of Massachusetts, Boston**
- **U of Memphis**
- **U of Missouri, Kansas City**
- **U of Missouri, St. Louis**
- **U of New Orleans**
- **U of Toledo**
- **U of Wisconsin, Milwaukee**
- **Virginia Commonwealth U**
- **Wayne State U**
- **California State University Sacramento†**

† Not actually in the Urban 13, but participated through affiliated work on Urban University Portfolio Project

Schools analyzed in boldface

Institutions Considered for Analysis

- Existing “Peer” Institutions
- SUS Institutions
- Collegiate Results Instrument Peer Institutions (Knight Collaborative)
- Selected US News & World Report Lower 3rd Tier Institutions (Provost)
- Selected US News & World Report Upper 4th Tier Institutions (Provost)
- Other Institutions—selected from member universities of the Coalition of Urban & Metropolitan Universities
- 66 in screening phase plus 12 in refinement phase
- Additional 34 in follow-on phase

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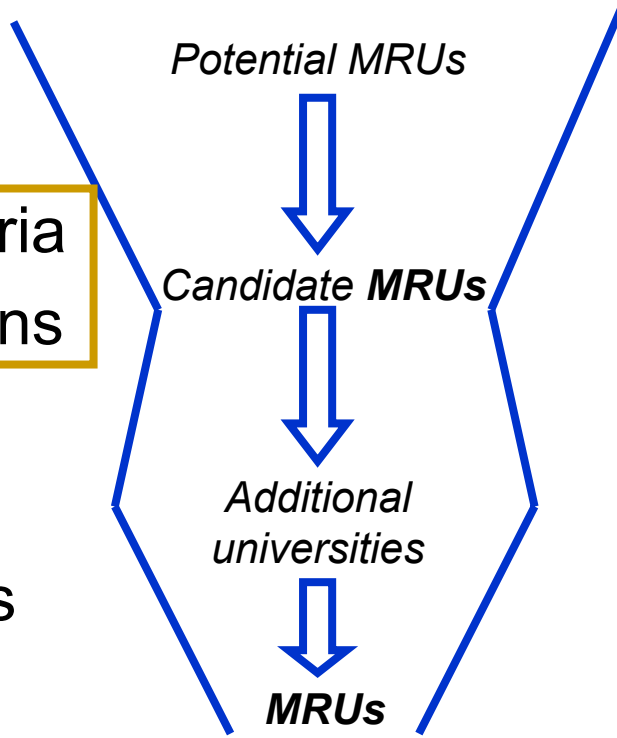

MRU Characteristics

- Metropolitan area characteristics
- Student characteristics
- Program structure characteristics
- Research characteristics
- Financial characteristics

Primary Data Sources

- Population characteristics
  - http://site.conway.com/ez/
- Student characteristics
  - http://nces.ed.gov/ipeds/
    http://www.usnews.com/usnews/edu/college/coworks.htm
  - Individual university websites
- Faculty characteristics
  - http://nces.ed.gov/ipeds/
- Research characteristics
  - http://www.nsf.gov
  - Web of Science
- Financial characteristics
  - http://nces.ed.gov/ipeds/

Variable Selection

- Data initially collected for 80 variables
- Initial analyses conducted with 43 variables
- Evaluations with various variables removed resulted in 29 variables for screening analysis phase
- Decision review resulted in modifying the variable list—21 final variables for refinement phase
- Further reduction to 12 variables by eliminating school size and metropolitan area characteristics

Note: [Data for variables and institutions are available upon request and will eventually be located at http://uaps.ucf.edu/Benchmarking.html]

Screening Phase Variables

- P-Actual population 1999
- P-% Urban population
- P-% White population
- P-% 18-24 years old
- P-% College or graduate degree
- P-% White collar occupation
- S-Ratio of UG to GR headcount
- S-Ratio of full-time to part-time headcount
- S-Total headcount
- S-% headcount White
- S-Ratio UG headcount to degrees awarded
- S-Ratio of GR headcount to graduate and doctoral degrees awarded
- ~~S-Doctoral degrees awarded~~
- ~~S-Doctoral programs offered~~
- S-Medical school
- ~~S-Acceptance rate~~
- ~~S-High school GPA~~
- F-Full-time faculty
- ~~F-Part-time faculty~~
- ~~F-Tenured faculty~~
- $-Ratio of expenditures per student
- $-Endowment
- $-R & D expenditures

Preliminary Screening Analysis

- Removed institutions with a total enrollment of less than 13,500 student headcount
  - Focus on “large” metropolitan research universities
  - Final institution list included 42 of the original 66 institutions
- Reduced the number of variables
- Categorized doctoral, R&D, and medical school variables as “research variables”

Synthesis of Screening Phase

- Ran analyses with research and without research variables
- For both sets of variables, ran analyses removing selected demographic and institution variables individually
- Number of clusters ranged from 4 to 10
- Universities were selected as potential MRU peers if they significantly showed up in the UCF cluster for three of four categories using research variables and cluster size

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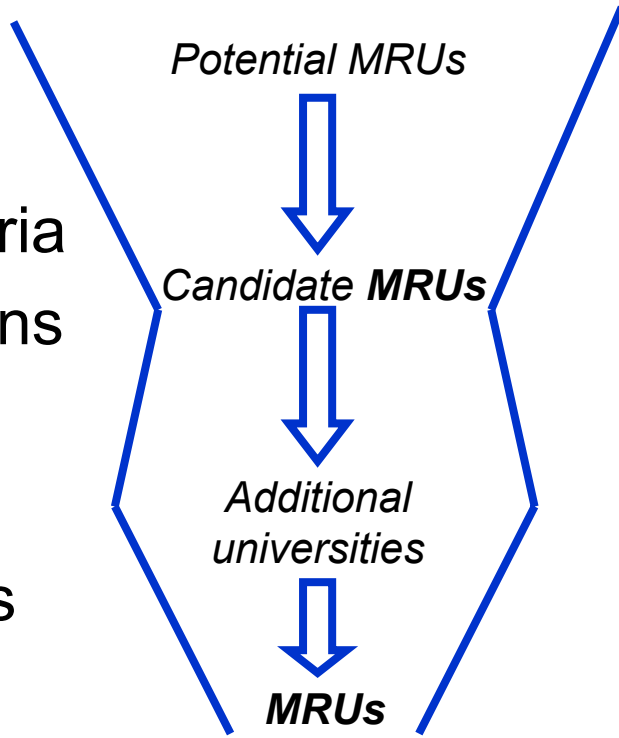

Moving from Screening Phase to Refinement Phase

- Screening phase identified
  - 16 potential peers
  - 6 almost potential peers
  - 5 current peers not otherwise included
- Review of selection variables
  - Modified variable list to 21 variables
- Review of institutions
  - Threshold criteria (>13,500 students, doctoral programs, research funding)
  - Reduced candidates to 29 institutions

Refinement Phase Variables

- *P-Actual population 1999*
- *P-% Urban population*
- *P-% White population*
- *P-% 18-24 years old*
- *P-% College or graduate degree*
- *P-% White collar occupation*
- **S-Ratio of UG to GR headcount**
- **S-Ratio of full-time to part-time headcount**
- *S-Total headcount*
- *S-% headcount White*
- **S-Ratio UG degrees awarded to UG headcount**
- **S-Ratio of graduate and doctoral degrees awarded to GR headcount**
- **S-Bachelor Programs awarded degrees**
- **S-Masters Programs awarded degrees**
- **S-Doctoral Programs awarded degrees**
- *S-Medical school*
- **F-Full-time faculty**
- **$-Ratio of expenditures per student**
- **$-Endowment**
- **R-R & D expenditures**
- **R-Publications per full-time faculty**

Note: Final variables in boldface; underlined variables added from screening phase

Synthesis of Refinement Phase

- Ran both K-Means and Hierarchical analyses
  - All 21 variables
  - Reduced set to 12 variables (removed 6 population, total headcount, ethnicity, and medical school variables)
- Used both standardized z-scores and 0-1 scale for data
- Number of clusters ranged from 2 to 10 for K-means
- Used multiple linking methods for hierarchical clusters
- Evaluated tabular and graphical results

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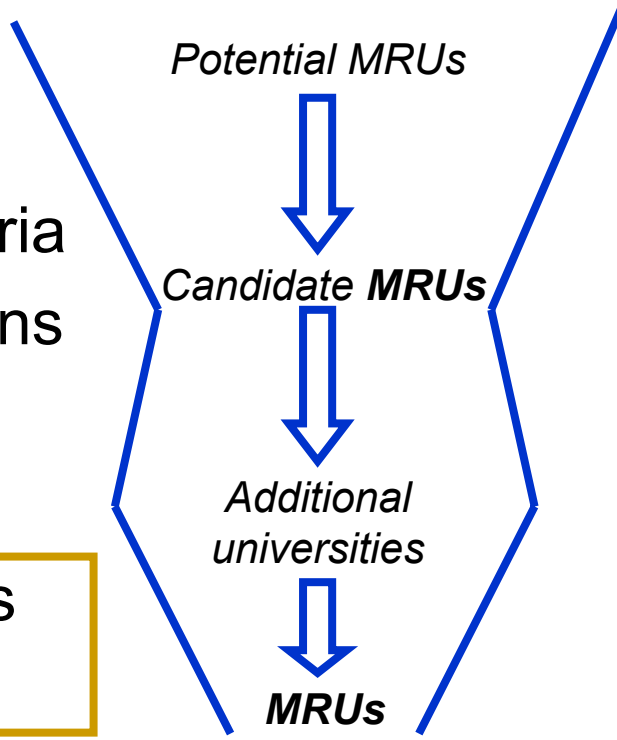
- Identify most similar university peers
- Repeat process until satisfied



Results of Refinement Phase

Similar Large MRU Peers (14)

- University of Central Florida (C) (P) (M)
- Florida Atlantic University (C)
- Florida International University (C) (M)
- Cleveland State University (C) (P)
- George Mason University (M)
- Old Dominion University
- Portland State University (C) (P) (M)
- San Diego State University (P)
- University of Missouri at St. Louis (C) (P)
- University of Nevada at Las Vegas (C)
- University of North Carolina at Charlotte (C)
- University of Texas at Arlington
- University of Toledo (P)
- University of Wisconsin– Milwaukee (P)

(current peer) (P)—PUMA (C)—CUMU (M)--MUG

Other Large MRU Peers (10)

- Georgia State University (C) (P) (M)
- Indiana University – Purdue University, Indianapolis (C) (P)
- Kent State University
- State University of New York, Albany
- University of Louisville (C) (M)
- University of South Florida (C)
- University of North Texas (C) (P)
- Virginia Commonwealth University (C) (M)
- Western Michigan University
- Wright State University (C)

Remote Large MRU Peers (5)

- North Carolina State University
- University of Alabama at Birmingham (P)
- University of Cincinnati (P)
- University of Delaware
- Wayne State University (P) (M)

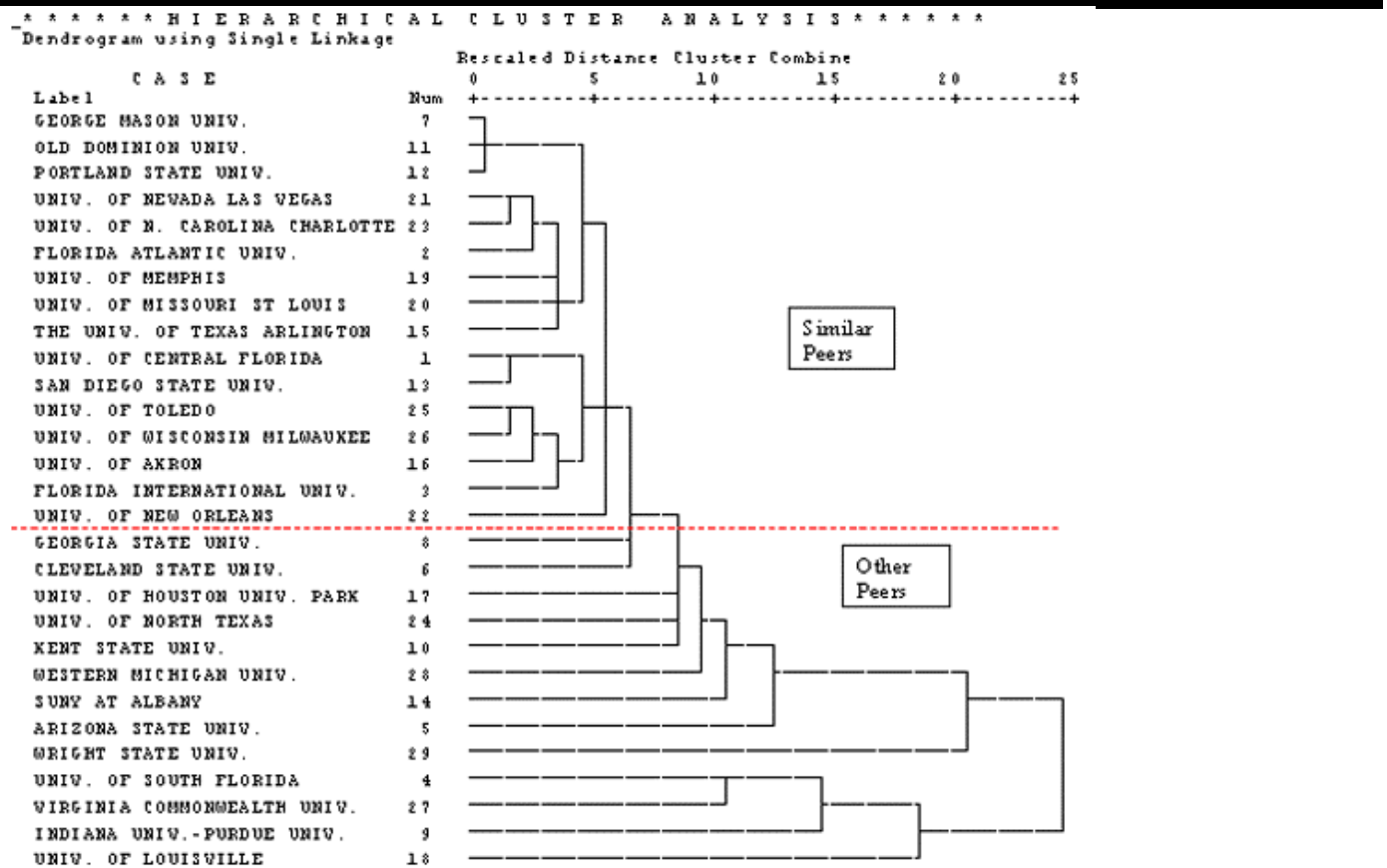
Moving from Refinement Phase to Follow-on Phase

- Refinement phase identified
  - 13 potential peers
  - 10 almost potential peers
  - 5 current peers not otherwise included
- Review of institutions
  - Interest in identifying aspirational peers
  - Academic and administrative input provided 25 additional institutions for review (some were already included in earlier phases but repeated in this phase)
  - State peers' (FAU, FIU, and USF) identified peer groups provided another 9 institutions for review
  - Increased candidates to 62 institutions

Synthesis of Follow-on Phase

- Ran both K-Means and Hierarchical analyses
  - Using same reduced set of 12 variables used in the refinement phase (with population, total headcount, ethnicity, and medical school variables removed) and a reduced set of 13 variables (including medical school variable)
- Used both standardized z-scores and 0-1 scale for data
- Number of clusters ranged from 2 to 10 for K-means
- Used multiple linking methods for hierarchical clusters
- Evaluated tabular and graphical results

Representative Dendrogram



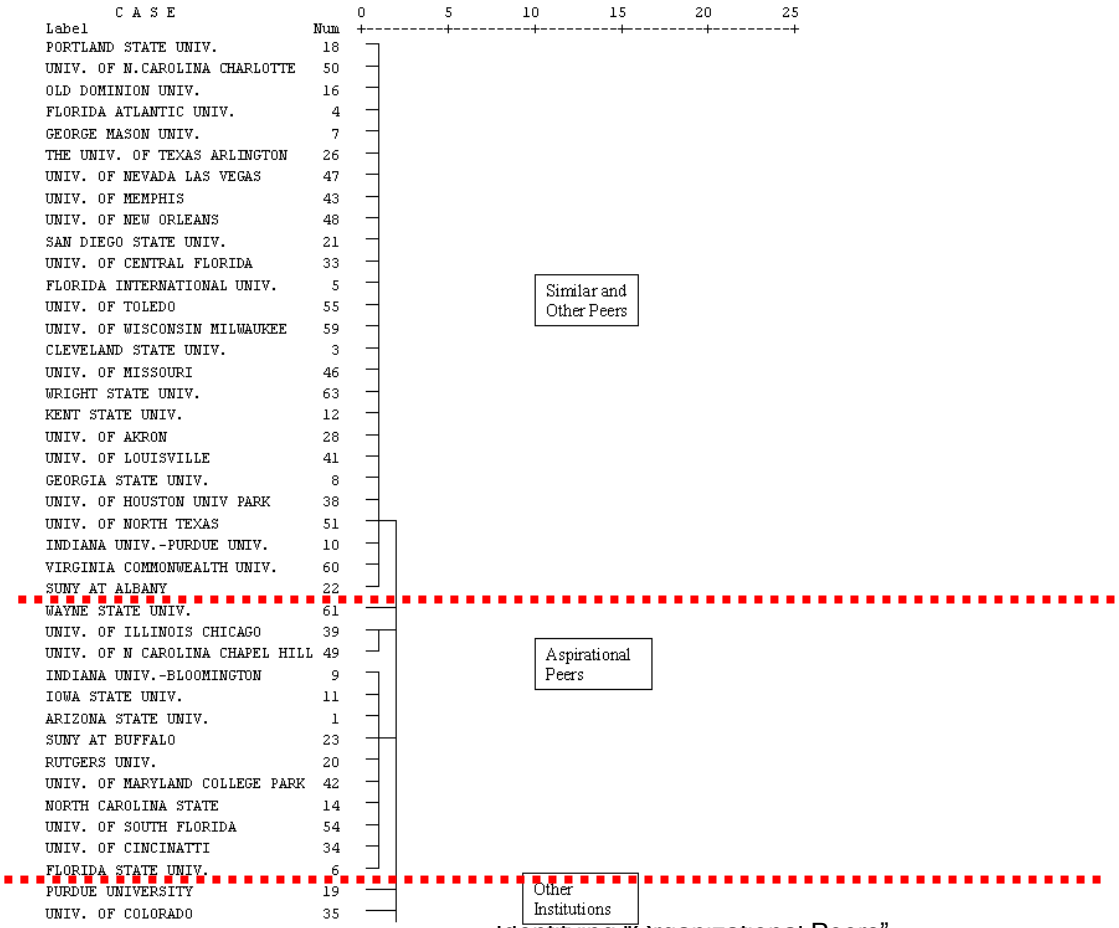
Representative K-Means Analysis

	all 29	sub 29	all 63	all 29rev	sub 29rev
CLEVELAND STATE UNIVERSITY	7	4	15	4	3
FLORIDA ATLANTIC UNIVERSITY-BOCA RATON	7	4	15	4	3
FLORIDA INTERNATIONAL UNIVERSITY	17	7	16	14	4
GEORGE MASON UNIVERSITY	7	4	15	4	3
OLD DOMINION UNIVERSITY	7	4	15	4	3
PORTLAND STATE UNIVERSITY	7	4	15	4	3
SAN DIEGO STATE UNIVERSITY	18	7	16	14	3
THE UNIVERSITY OF TEXAS AT ARLINGTON	7	4	15	4	3
UNIVERSITY OF AKRON MAIN CAMPUS	N/A	N/A	16	12	4
UNIVERSITY OF MEMPHIS	N/A	N/A	14	4	3
UNIVERSITY OF MISSOURI-ST LOUIS	7	4	15	4	3
UNIVERSITY OF NEVADA-LAS VEGAS	10	5	15	4	3
UNIVERSITY OF NEW ORLEANS	N/A	N/A	15	4	3
UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE	10	5	15	5	3
UNIVERSITY OF TOLEDO	14	4	16	14	4
UNIVERSITY OF WISCONSIN-MILWAUKEE	17	7	16	15	4
WESTERN MICHIGAN UNIVERSITY	8	3	16	11	3
ARIZONA STATE UNIVERSITY-MAIN CAMPUS	N/A	N/A	14	1	1
GEORGIA STATE UNIVERSITY	7	4	16	3	2
INDIANA UNIVERSITY-PURDUE UNIVERSITY-INDIANAPOL	5	2	15	1	1
KENT STATE UNIVERSITY-MAIN CAMPUS	7	2	16	6	2
SUNY AT ALBANY	8	4	16	2	1
UNIVERSITY OF HOUSTON-UNIVERSITY PARK	N/A	N/A	15	2	1
UNIVERSITY OF LOUISVILLE	6	2	15	1	1
UNIVERSITY OF NORTH TEXAS	8	3	16	2	1
UNIVERSITY OF SOUTH FLORIDA	2	1	12	1	1
VIRGINIA COMMONWEALTH UNIVERSITY	5	2	15	1	1
WRIGHT STATE UNIVERSITY-MAIN CAMPUS	7	3	15	9	2

Similar Peers?

Other Peers?

Representative Dendrogram



Representative K-Means Analysis

	63/12	63/13	all 63
FLORIDA STATE UNIVERSITY	2	4	6
INDIANA UNIVERSITY-BLOOMINGTON	2	3	5
IOWA STATE UNIVERSITY	2	2	4
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH	2	2	4
RUTGERS UNIVERSITY-NEW BRUNSWICK	2	3	5
SUNY AT BUFFALO	5	3	8
UNIVERSITY OF CINCINNATI-MAIN CAMPUS	5	2	7
UNIVERSITY OF ILLINOIS AT CHICAGO	1	0	1
UNIVERSITY OF MARYLAND-COLLEGE PARK	0	0	0
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL	0	0	0
WAYNE STATE UNIVERSITY	7	4	11
PENNSYLVANIA STATE UNIVERSITY-MAIN CAMPUS	1	0	1
PURDUE UNIVERSITY-MAIN CAMPUS	2	2	4
TEMPLE UNIVERSITY	0	2	2
UNIVERSITY OF ALABAMA AT BIRMINGHAM	2	1	3
UNIVERSITY OF CALIFORNIA-IRVINE	1	1	2
UNIVERSITY OF COLORADO AT BOULDER	4	5	9
UNIVERSITY OF DELAWARE	6	8	14

Aspirational Peers?

Other Institutions?

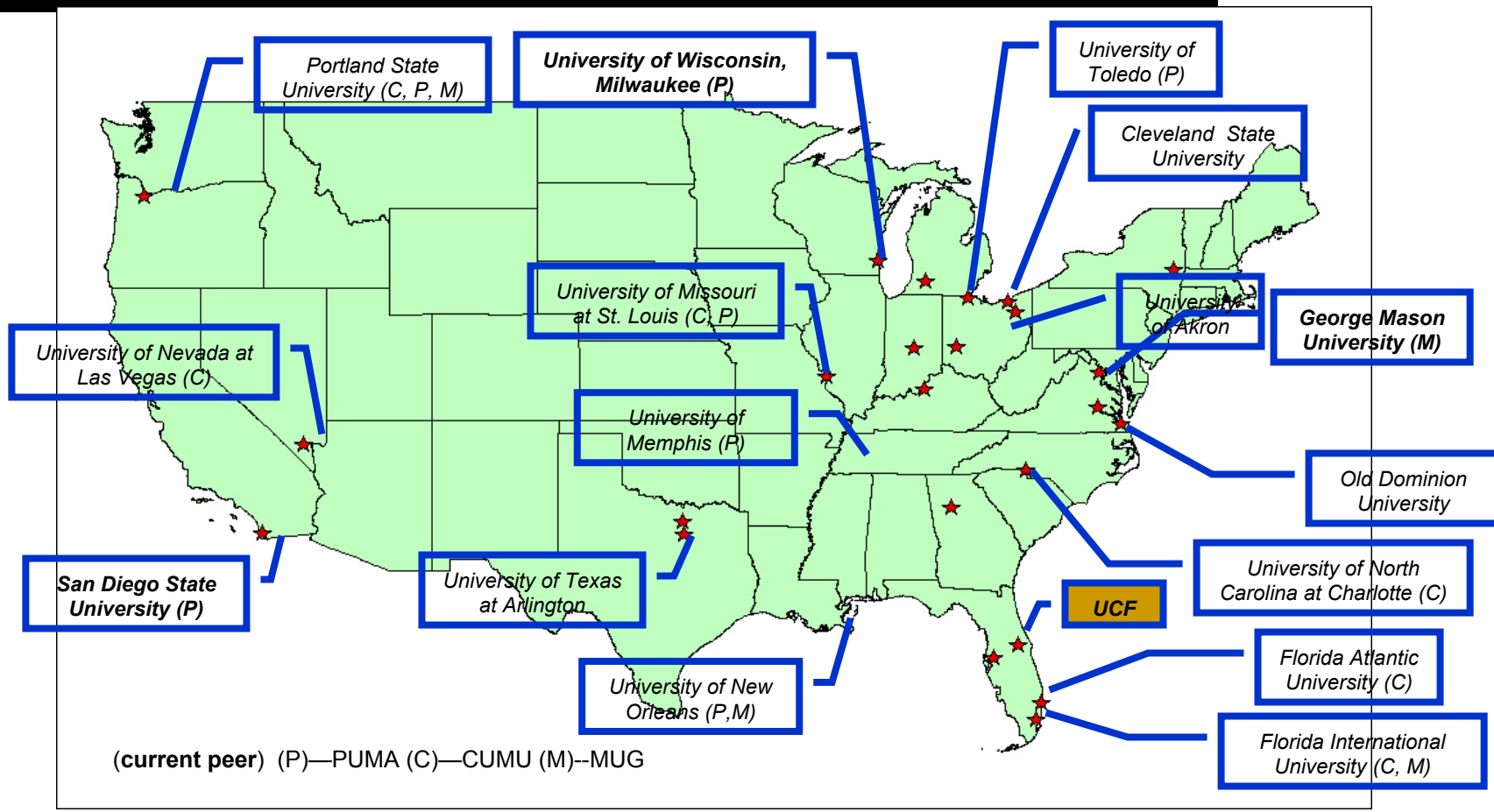
Results of Follow-on Phase

- Three additional institutions identified as *similar* peers
- Two additional institutions identified as *other* peers
- 11 institutions identified as potential *aspirational* peers

Results: Similar Large MRU Peer Universities (16)

- University of Central Florida (C) (P) (M)
- Cleveland State University (C) (P)
- Florida Atlantic University (C)
- Florida International University (C) (M)
- George Mason University (M)
- Old Dominion University
- Portland State University (C) (P) (M)
- San Diego State University (P)
- University of Akron (M)
- University of Memphis (P)
- University of Missouri at St. Louis (C) (P)
- University of Nevada at Las Vegas (C)
- University of New Orleans (P) (M)
- University of North Carolina at Charlotte (C)
- University of Texas at Arlington
- University of Toledo (P)
- University of Wisconsin– Milwaukee (P)

Similar Large MRU Peers



Similar Large MRU Peers—Selected Data (2001)

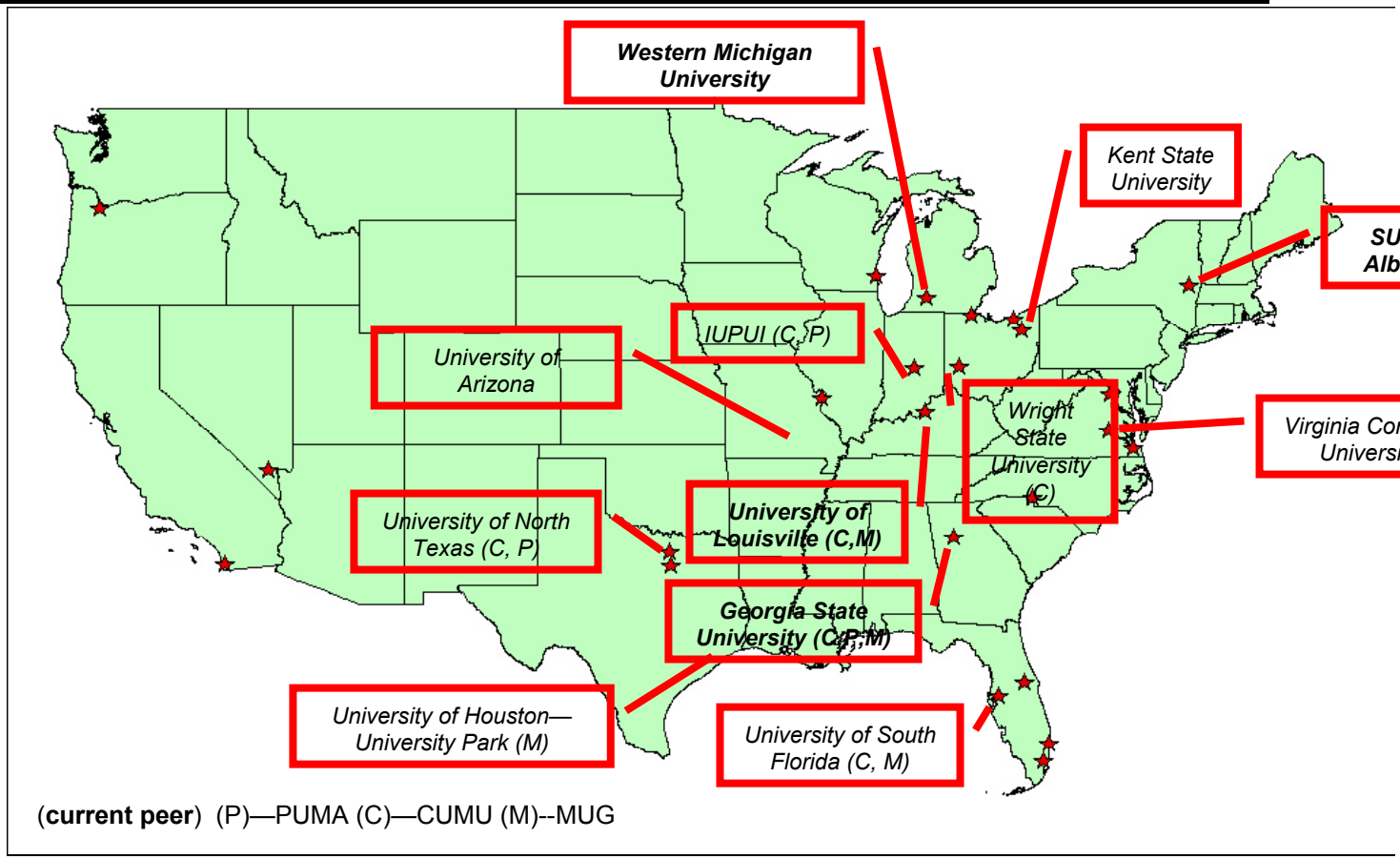
Institution Name	Grants a medical degree(FA2001HD)	2001 Total Enrollment	2001 UG/GR ratio	2001 FT/PT	2001 Ratio of UG degrees awarded to UG enrollment	2001 Ratio of GR degrees awarded to GR enrollment	Bachelors Programs awarded degrees	Masters Programs awarded degrees	Doctoral Programs awarded degrees	2001 FT Faculty	Ending value of endowment assets-market(F0001_F1)	Expenditures per student	2001 NSF R&D Expenditures	2001 Publications per Faculty
CLEVELAND STATE UNIVERSITY	N	15701	2.34	1.24	0.15	0.29	51	34	6	525	17814517	12137.65	12986	0.46
FLORIDA ATLANTIC UNIVERSITY-BOCA RATON	N	23345	4.78	0.91	0.18	0.23	50	44	11	760	98488000	11586.59	25111	0.48
FLORIDA INTERNATIONAL UNIVERSITY	N	31727	4.51	1.24	0.17	0.28	73	66	17	792	44336748	11174.18	44291	0.63
GEORGE MASON UNIVERSITY	N	24897	1.89	1.11	0.19	0.21	45	35	13	965	33933132	12914.01	32881	0.48
OLD DOMINION UNIVERSITY	N	19627	2.01	1.08	0.16	0.20	48	41	12	603	12581701	10637.22	24659	0.48
PORTLAND STATE UNIVERSITY	N	20024	2.60	1.07	0.16	0.22	61	59	10	641	2057214	9821.05	16838	0.35
SAN DIEGO STATE UNIVERSITY	N	34171	4.58	2.55	0.19	0.28	73	59	9	1041	58819010	16158.79	58332	0.55
THE UNIVERSITY OF TEXAS AT ARLINGTON	N	21180	3.37	1.71	0.18	0.24	53	53	30	767	31366435	10524.48	17486	0.45
UNIVERSITY OF AKRON MAIN CAMPUS	N	22368	5.15	1.89	0.11	0.29	120	80	16	780	54105773	12615.24	22266	0.69
UNIVERSITY OF CENTRAL FLORIDA	N	35850	5.32	2.07	0.20	0.29	74	50	14	976	65390586	10155.75	79287	0.46
UNIVERSITY OF MEMPHIS	N	20332	3.62	1.98	0.13	0.22	57	45	18	798	138782372	12072.85	29445	0.47
UNIVERSITY OF MISSOURI-ST LOUIS	N	14993	4.75	0.70	0.15	0.26	40	27	7	496	35851977	10371.72	10084	0.78
UNIVERSITY OF NEVADA-LAS VEGAS	N	23313	4.36	1.39	0.15	0.19	86	48	13	716	39805000	11077.21	27008	0.55
UNIVERSITY OF NEW ORLEANS	N	17014	3.20	1.74	0.11	0.21	45	38	12	515	12829722	9733.08	0	1.06
UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE	N	18308	4.77	2.00	0.16	0.21	68	52	7	644	79274284	12240.63	7905	0.50
UNIVERSITY OF TOLEDO	N	20313	5.62	2.36	0.12	0.30	82	65	16	749	36524703	13623.81	16278	0.44
UNIVERSITY OF WISCONSIN-MILWAUKEE	N	24216	4.68	2.19	0.14	0.30	72	46	17	900	5552353	13418.78	23492	0.70

Results: Other Large MRU Peer Universities (12)

- Arizona State University
- Georgia State University (C) (P) (M)
- Indiana University – Purdue University Indianapolis (C) (P)
- Kent State University
- State University of New York, Albany
- University of Houston-University Park (M)
- University of Louisville (C) (M)
- University of North Texas (C) (P)
- University of South Florida (C)
- Virginia Commonwealth University (C) (M)
- Western Michigan University
- Wright State University (C)

(current peer) (P)—PUMA (C)—CUMU (M)—MUG

Other Large MRU Peers



(**current peer**) (P)—PUMA (C)—CUMU (M)--MUG

Other Large MRU Peers—Selected Data (2001)

Institution Name	Grants a medical degree(FA2001 HD)	2001 Total Enrollment	2001 UG/GR ratio	2001 FT/PT	2001 Ratio of UG degrees awarded to UG enrollment	2001 Ratio of GR degrees awarded to GR enrollment	Bachelors Programs awarded degrees	Masters Programs awarded degrees	Doctoral Programs awarded degrees	2001 FT Faculty	Ending value of endowment assets-market(F0001_F1)	Expenditures per student	2001 NSF R&D Expenditures	2001 Publications per Faculty
ARIZONA STATE UNIVERSITY-MAIN CAMPUS	N	45693	3.53	2.94	0.19	0.26	84	76	46	1682	60371000	15868.78	118763	1.01
GEORGIA STATE UNIVERSITY	N	25743	2.65	1.46	0.14	0.28	51	71	38	1090	51532461	13881.08	38960	0.52
INDIANA UNIVERSITY-PURDUE UNIVERSITY-INDIANAPOLIS	Y	28339	3.91	1.15	0.11	0.20	63	46	15	1758	22319431	27118.40	756	0.19
KENT STATE UNIVERSITY-MAIN CAMPUS	N	22828	4.13	3.25	0.18	0.27	83	72	39	648	43306953	13490.15	11316	0.85
SUNY AT ALBANY	N	17204	2.23	3.03	0.21	0.26	45	58	35	592	1033727	18500.91	70119	1.18
UNIVERSITY OF CENTRAL FLORIDA	N	35850	5.32	2.07	0.20	0.29	74	50	14	976	65390586	10155.75	79287	0.46
UNIVERSITY OF HOUSTON-UNIVERSITY PARK	N	33007	4.20	1.99	0.15	0.24	81	87	42	957	202857134	13675.07	51567	1.36
UNIVERSITY OF LOUISVILLE	Y	19682	3.28	1.98	0.13	0.28	62	55	20	1300	503207000	25804.24	72857	0.81
UNIVERSITY OF NORTH TEXAS	N	27858	3.51	2.18	0.17	0.20	85	87	44	775	41611284	11030.36	7380	0.71
UNIVERSITY OF SOUTH FLORIDA	Y	37221	3.57	1.36	0.18	0.23	73	76	21	1909	234223183	17862.03	171550	0.71
VIRGINIA COMMONWEALTH UNIVERSITY	Y	25001	2.66	1.74	0.13	0.22	50	56	23	1660	27313250	20381.83	99180	0.85
WESTERN MICHIGAN UNIVERSITY	N	28931	4.01	2.59	0.17	0.24	139	61	29	916	117519875	13302.34	14976	0.34
WRIGHT STATE UNIVERSITY-MAIN CAMPUS	Y	13829	3.63	3.20	0.18	0.25	78	81	5	645	6139159	17342.10	32033	0.76

Results: Aspirational Peer Universities (11)

- Florida State University
- Indiana University, Bloomington
- Iowa State University
- North Carolina State University
- Rutgers University
- State University of New York, Buffalo
- University of Cincinnati – Main Campus (P)
- University of Illinois at Chicago (C)
- University of Maryland, College Park (C)
- University of North Carolina, Chapel Hill
- Wayne State University (P) (M)

(current peer) (P)—PUMA (C)—CUMU (M)—MUG

Aspirational Peers—Selected Data (2001)

Institution Name	Grants a medical degree(FA2001 HD)	2001 Total Enrollment	2001 UG/GR ratio	2001 FT/PT	2001 Ratio of UG degrees awarded to UG enrollment	2001 Ratio of GR degrees awarded to GR enrollment	Bachelors Programs awarded degrees	Masters Programs awarded degrees	Doctoral Programs awarded degrees	2001 FT Faculty	Ending value of endowment assets-market(F0001_F1)	Expenditures per student	2001 NSF R&D Expenditures	2001 Publications per Faculty
FLORIDA STATE UNIVERSITY	N	34982	4.69	4.25	0.21	0.30	88	89	60	1243	328881563	16768.53	113817	0.98
INDIANA UNIVERSITY-BLOOMINGTON	N	37963	4.37	6.30	0.19	0.28	83	87	65	1562	116384599	28445.78	259899	1.52
IOWA STATE UNIVERSITY	Y	27823	5.29	6.21	0.18	0.24	100	103	75	1362	83361702	25693.34	179196	1.44
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH	Y	29286	3.41	2.96	0.18	0.23	81	95	59	1604	310616000	27863.28	299259	1.40
RUTGERS UNIVERSITY-NEW BRUNSWICK	N	35650	4.01	3.95	0.20	0.24	89	72	60	1906	405405000	31528.36	236793	1.40
SUNY AT BUFFALO	Y	25838	2.61	4.00	0.18	0.24	58	73	55	1406	279804233	23917.23	186829	1.10
UNIVERSITY OF CENTRAL FLORIDA	N	35850	5.32	2.07	0.20	0.29	74	50	14	976	65390586	10155.75	79287	0.46
UNIVERSITY OF CINCINNATI-MAIN CAMPUS	Y	27289	3.07	2.57	0.15	0.22	95	97	52	1809	907216581	24433.92	192895	1.17
UNIVERSITY OF ILLINOIS AT CHICAGO	Y	24955	2.33	4.26	0.20	0.27	77	78	55	1978	898424000	49391.84	233098	1.38
UNIVERSITY OF MARYLAND-COLLEGE PARK	Y	34160	2.81	4.41	0.22	0.24	97	76	67	2740	290900935	29792.97	267383	1.05
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL	Y	25494	2.16	5.06	0.22	0.28	62	91	65	2374	1113515000	53679.22	303576	1.71
WAYNE STATE UNIVERSITY	Y	31040	1.89	0.88	0.13	0.26	84	99	45	1493	146821526	20860.76	175984	1.44

Implementation and Use

- Official review and approval
- Develop relevant performance measures for MRUs
  - Management focus
  - Accountability considerations
  - PUMA dimensions (access and support; student learning in the urban context; diversity and pluralism; civic engagement; urban relevance of programs and scholarship)
- Assess vision—become the nation's leading metropolitan research university
  - Identify "comparison" peers—most similar performance
  - Identify "aspirational" MRU peers—*best-in-class*
- Use for benchmarking and continuous improvement

Observations

- Cluster analysis works well for identifying peers
- Selecting appropriate criteria variables requires very careful consideration
  - Multiple analyses required to determine if any are “drivers”
- Require very close attention to finding the “correct” data
  - Some data (e.g., publications) are very tricky
- Broad selection of “potential” peers is required
- Need to distinguish between current and aspirational peers
- “Political” considerations
- User involvement

Questions

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