

A Hybrid Approach to Identifying National Peer Institutions

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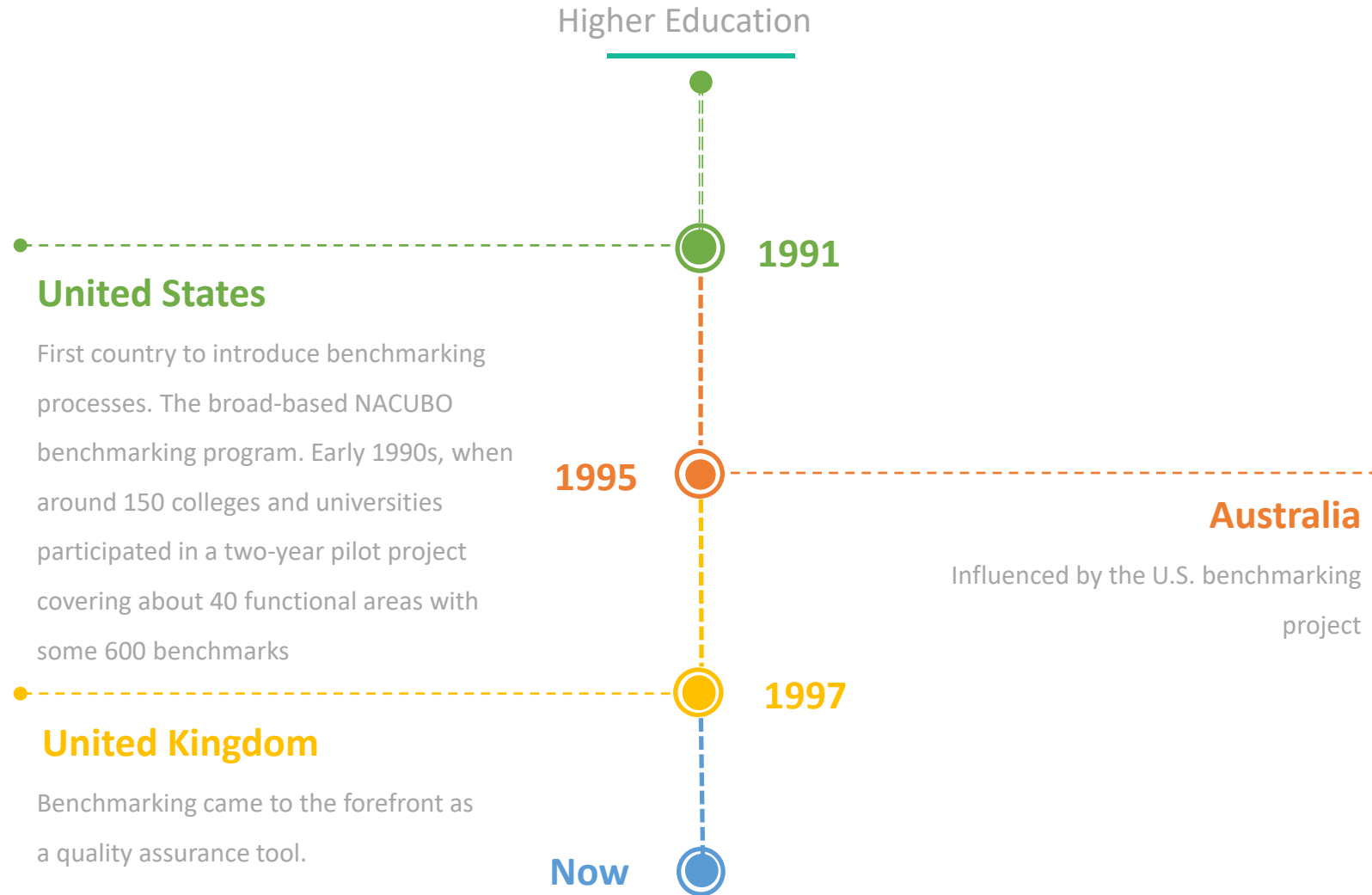
TAIR Conference - 2022

Expected Learning Outcomes



- 01 Benchmarking**
You will have background knowledge about the historical development and purpose of benchmarking.
- 02 Data Utilization**
You will be able to utilize data from different sources as a first step to identify national peer institutions.
- 03 Identifying National Peer Institutions Methodologies**
You will have background knowledge about the methodologies used to identify national peer institutions.
- 04 Hybrid Approach to Identifying National Peer Institutions**
You will be able to apply the proposed hybrid model to identify the national peer institutions.

The Historical Development of Benchmarking



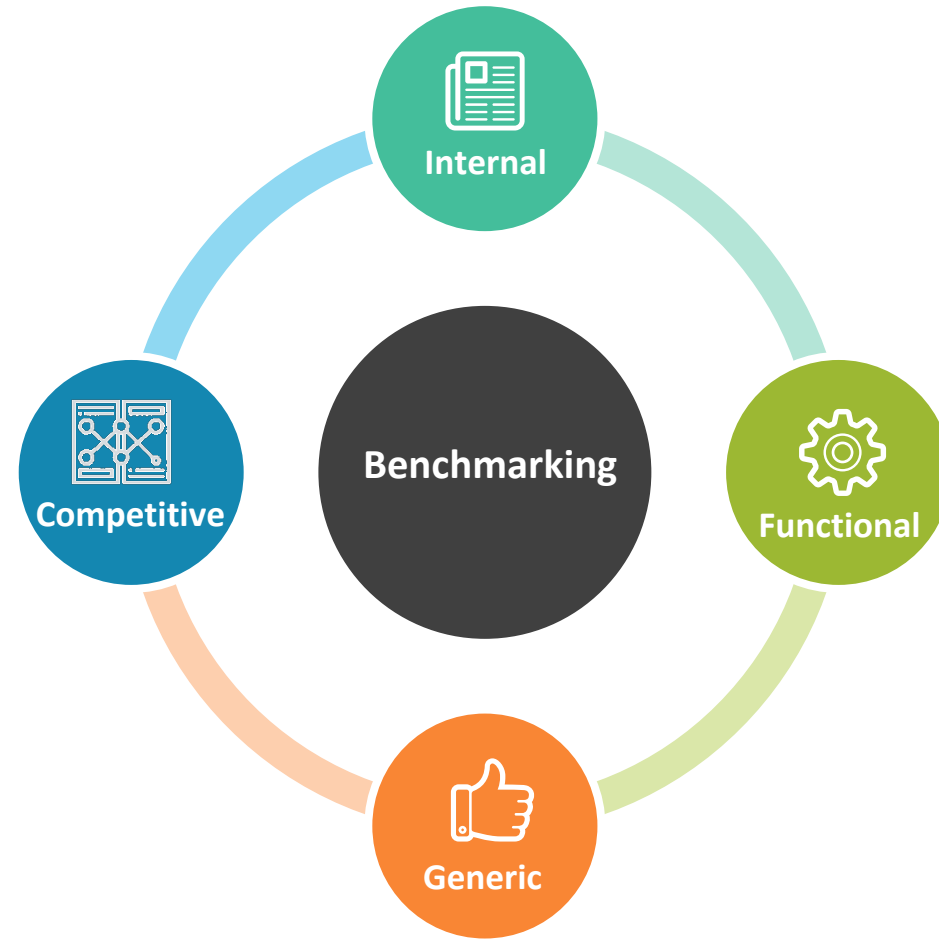
Types of Benchmarking

Competitive Benchmarking

An organization's performance is measured against its peers or competitors.

Generic Benchmarking

One organization's processes are compared against exemplars of truly innovative practices and world class performance levels, regardless of industry.



Internal Benchmarking

Work processes are compared between departments, divisions, or other internal company segments.

Functional Benchmarking

An organization's performance is compared against similar processes in the same function but at companies outside its own industry.

Benchmarking



Groups Identification

How to define the landscape in higher education?

Aspirational Group

Institutions that look like your strategic goals. It is a road map for your strategic planning. Look five years into the future: What do you want your institution to become? Will it have larger total enrollment, increasing Pell eligible students, increasing average GPA?



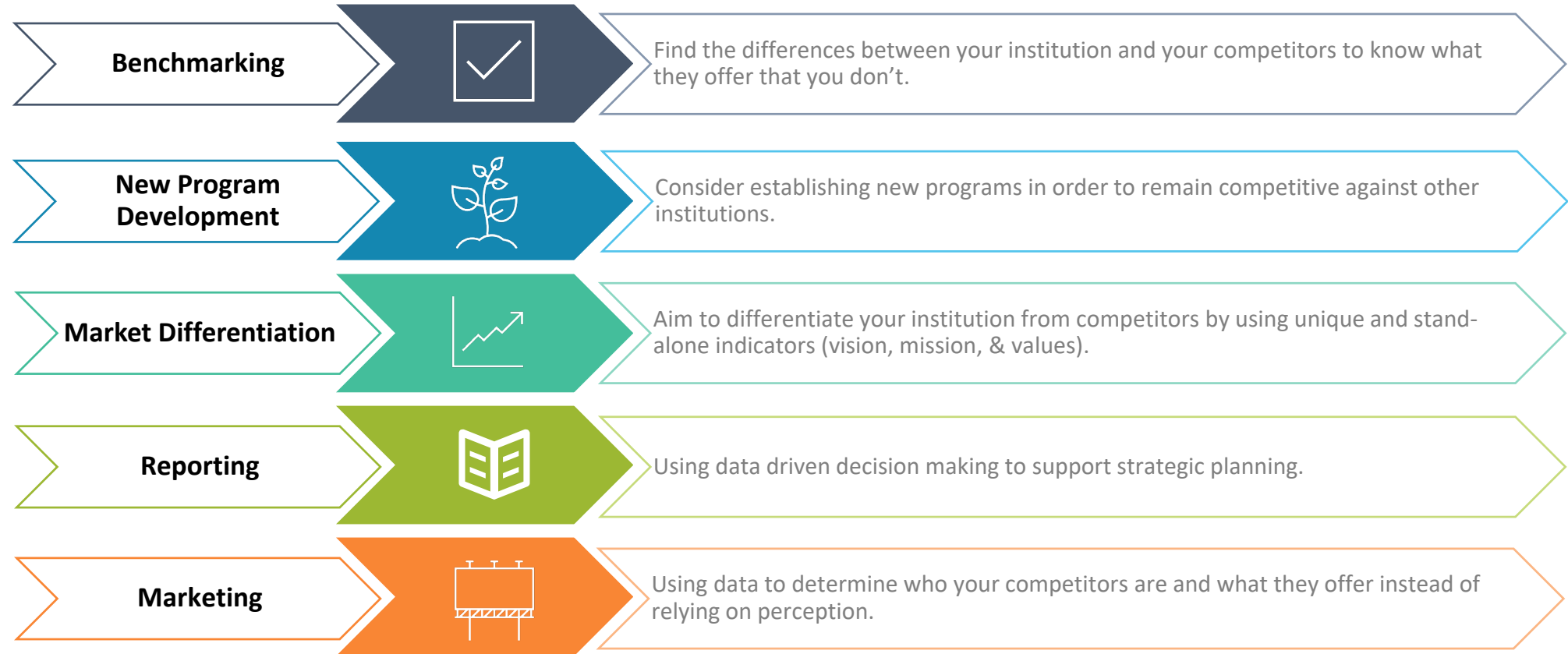
Peers Group

Peers are the institutions that look like you; they have similar settings and student bodies.

Competitors Group

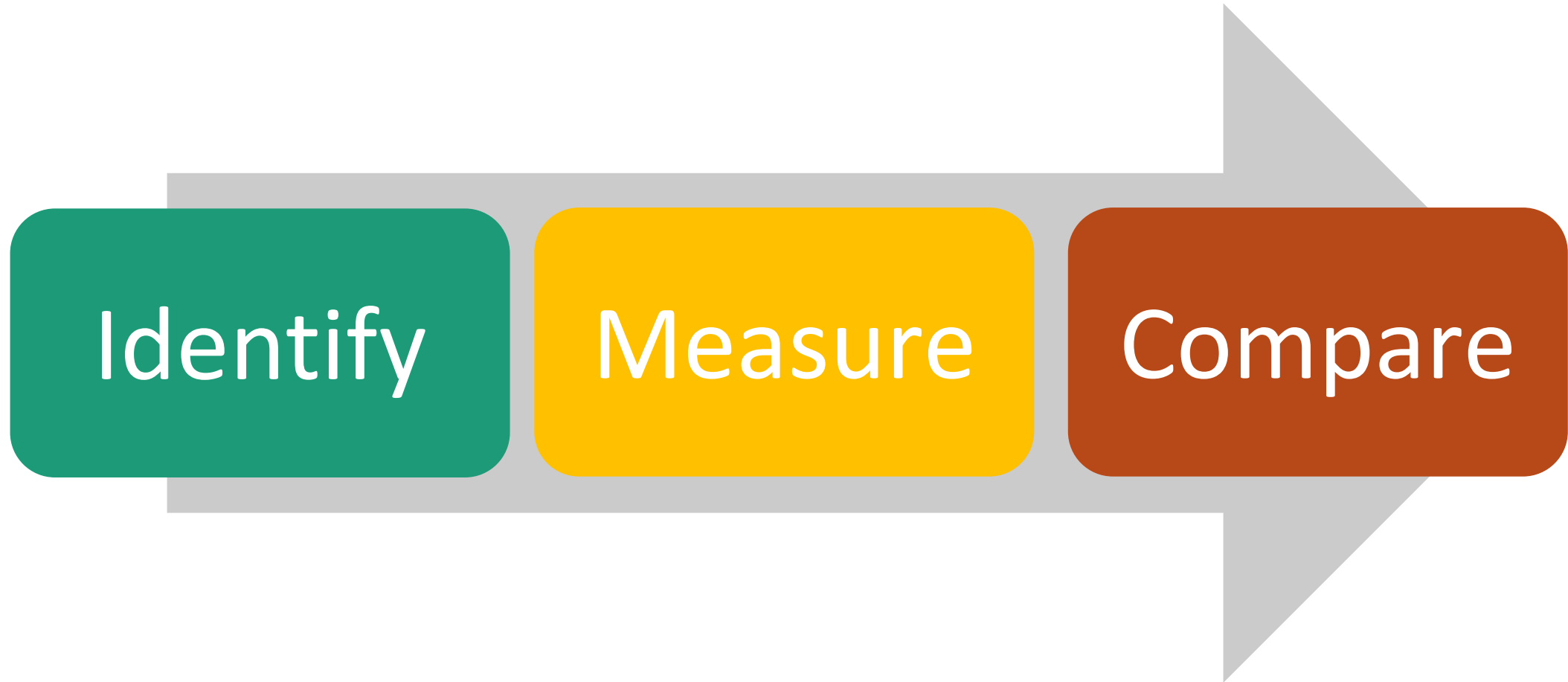
A competitor is an institution that you see large numbers of students considering and/or enrolling in. The most discussed on campus.

Group Identification Research



Competitive Benchmarking

Benchmarking process:

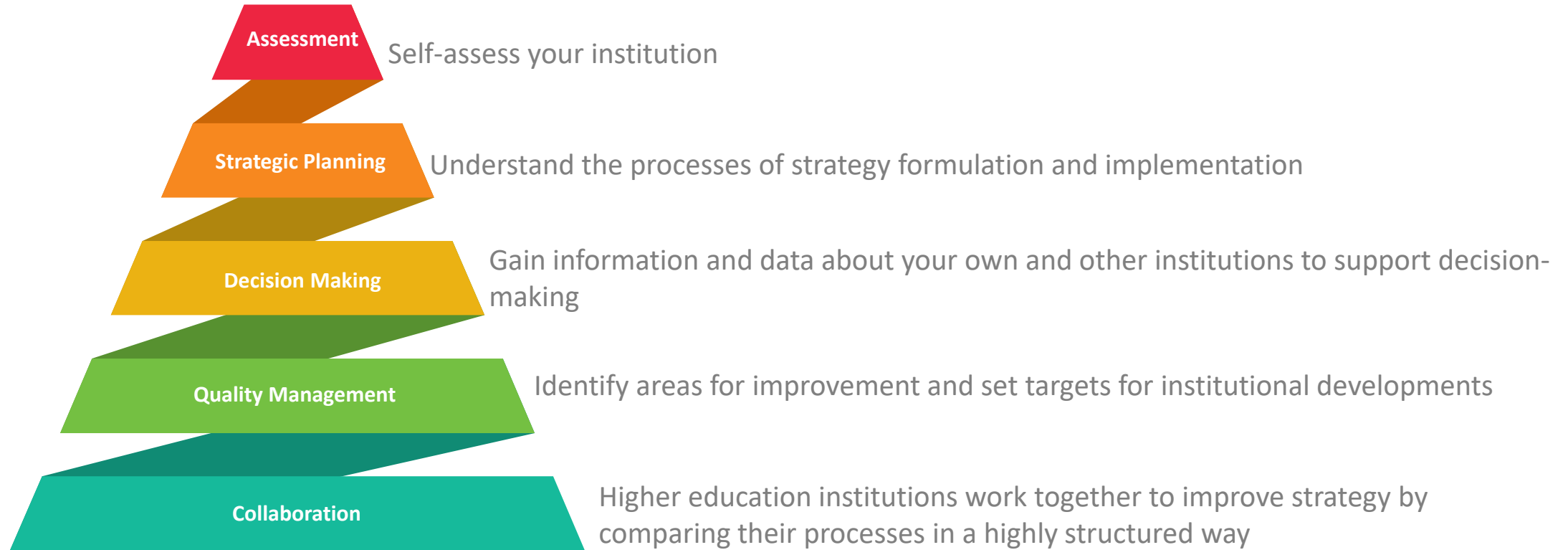


Competitive Benchmarking

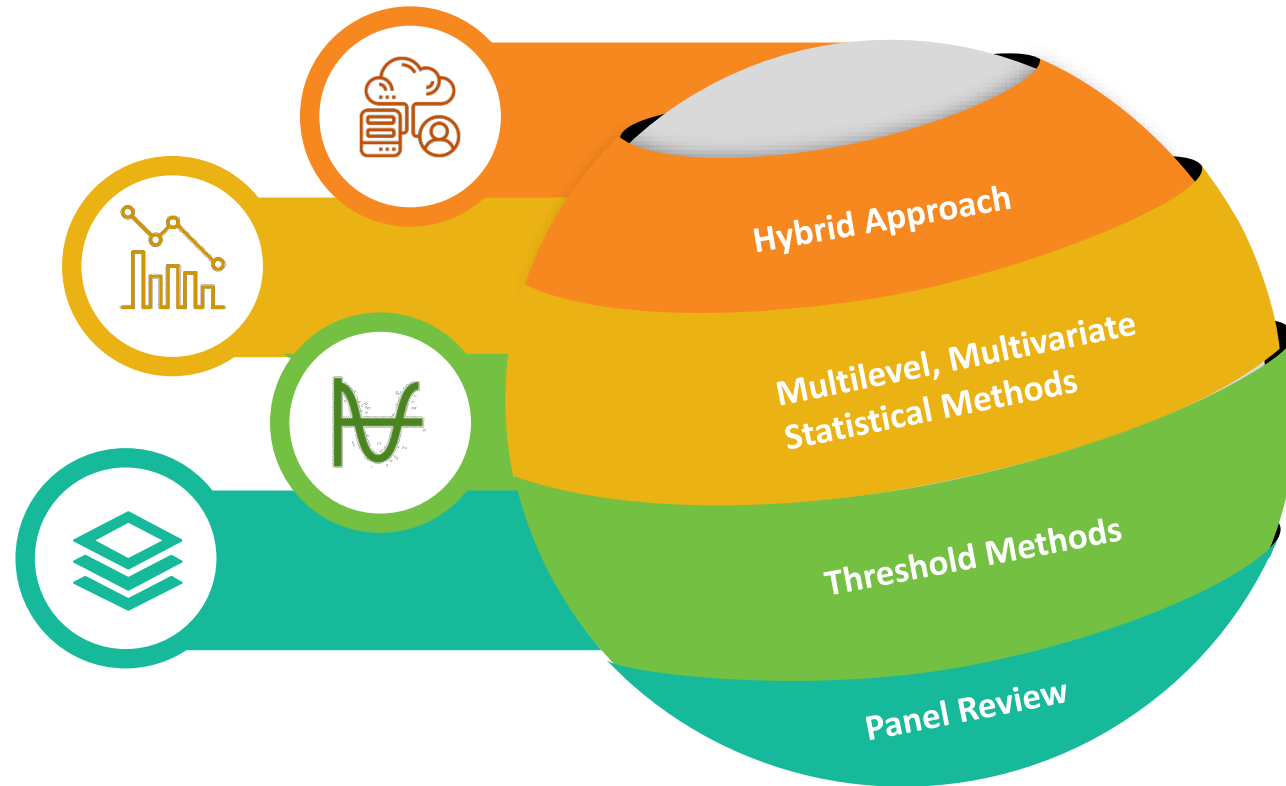
Competitive Benchmarking attempts to answer the following questions:

- 1 How well are we doing compared to others?
- 2 How good do we want to be?
- 3 Who is doing it the best?
- 4 How do they do it?
- 5 How can we adapt what they do to our institution?
- 6 How can we be better than the best?

Competitive Benchmarking



Identifying National Peer Institutions - Methodologies



Panel Review

Subjective Judgement

Qualitative and rely on informed judgement.

A group of high-level administrators meet to reach a consensus on a variety of metrics related to group identification.



Threshold Methods

Points System Based on Criterion Measure

Involves discriminating between institutions based upon nominal and interval level institutional characteristics by assigning points. They received the point if they were +/- one-quarter of a standard deviation of the national mean.

Variable	JU Value	Low Threshold	High Threshold	Number Receiving Point
Sector	Private not-for-profit, 4-year or above			1,700
Carnegie Classification	Master's Colleges & Universities: Larger Programs			371
ICUF Membership	Member			28
Admissions Peer				16
<i>U.S. News and World Report</i> Regional University Ranking (45-65)	Yes			90
SACSCOC Member Institution	Yes			986
Pioneer Conference Member	Yes			10
Full-Time Equivalent Enrollment	3,236	2,501	3,999	408
Percentage of Full-Time Equivalent Enrollment—Undergraduate	76.6	69.7	83.5	393
Tuition and Fees as a Percent of Core Revenues	74	67	81	430
Endowment Assets per FTE Enrollment	\$12,162	\$7,163	\$17,161	495
Instruction Expenses as a Percent of Total Core Expenses	46	43	49	914
Salaries and Wages for Core Expenses as a Percent of Total Core Expenses	47	45	49	1,062
Average Net Price for Students Awarded Grant or Scholarship Aid	\$25,674	\$23,539	\$26,899	275
Full-time Retention Rate	71	66	75	728
Six-year Graduation Rate	43	37	49	565
Percent of Undergraduate Students Awarded Pell Grants	28	23	33	859

Threshold Methods

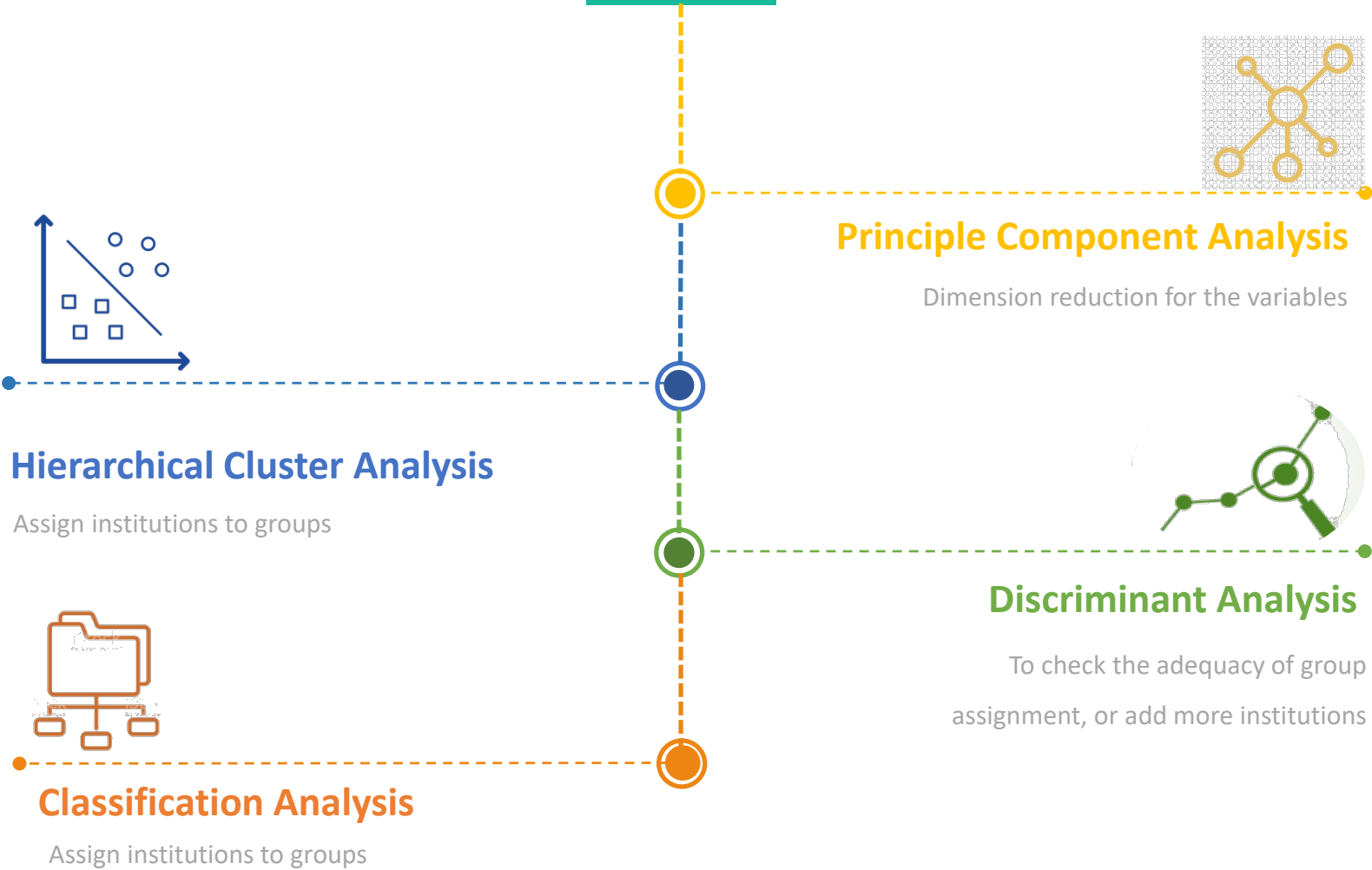
Arbitrary
Rarely any justification is given for selecting one set of inclusion threshold over another. For example, on what basis are enrollment intervals selected as threshold?

Limited in the number of institutional traits and inclusion levels that can be considered

Priori specification of the threshold

What evidence can be advanced to support the prior specification of a given structure.

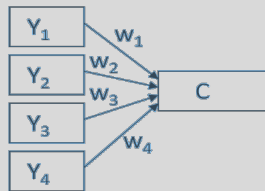
Multivariate Statistical Methodology



Principal Component Analysis vs. Factor Analysis

Principal Component Analysis (PCA)

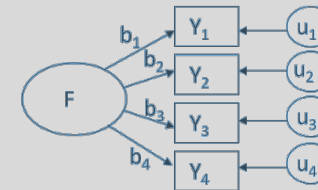
- PCA is a linear combination of observed variables for the purpose of dimension reduction.
- The analysis produces full correlation matrix.



- PCA is combining 4 measured (Y) variables into a single component, C. Y variables contribute to the component variable. The weights allow this combination to emphasize some Y variables more than others.
- This model can be set up as a simple equation:
$$C = w_1(Y_1) + w_2(Y_2) + w_3(Y_3) + w_4(Y_4)$$

Factor Analysis (FA)

- FA is a measurement model of a latent variable
- The analysis produces reduced correlation matrix.



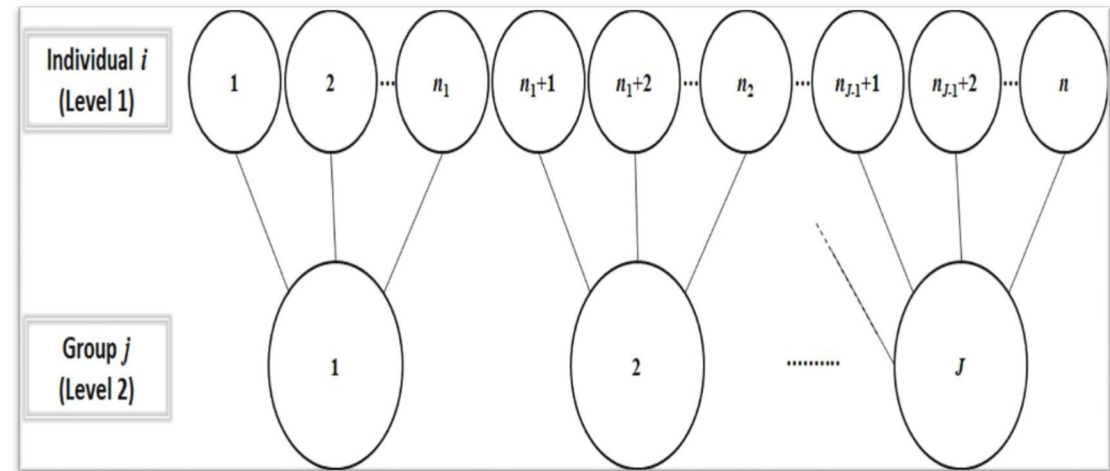
- This is the variance in each Y that is explained by the factor.
- You can literally interpret this model as a set of regression equations:

$$\begin{aligned} Y_1 &= b_1 * F + u_1 \\ Y_2 &= b_2 * F + u_2 \\ Y_3 &= b_3 * F + u_3 \\ Y_4 &= b_4 * F + u_4 \end{aligned}$$

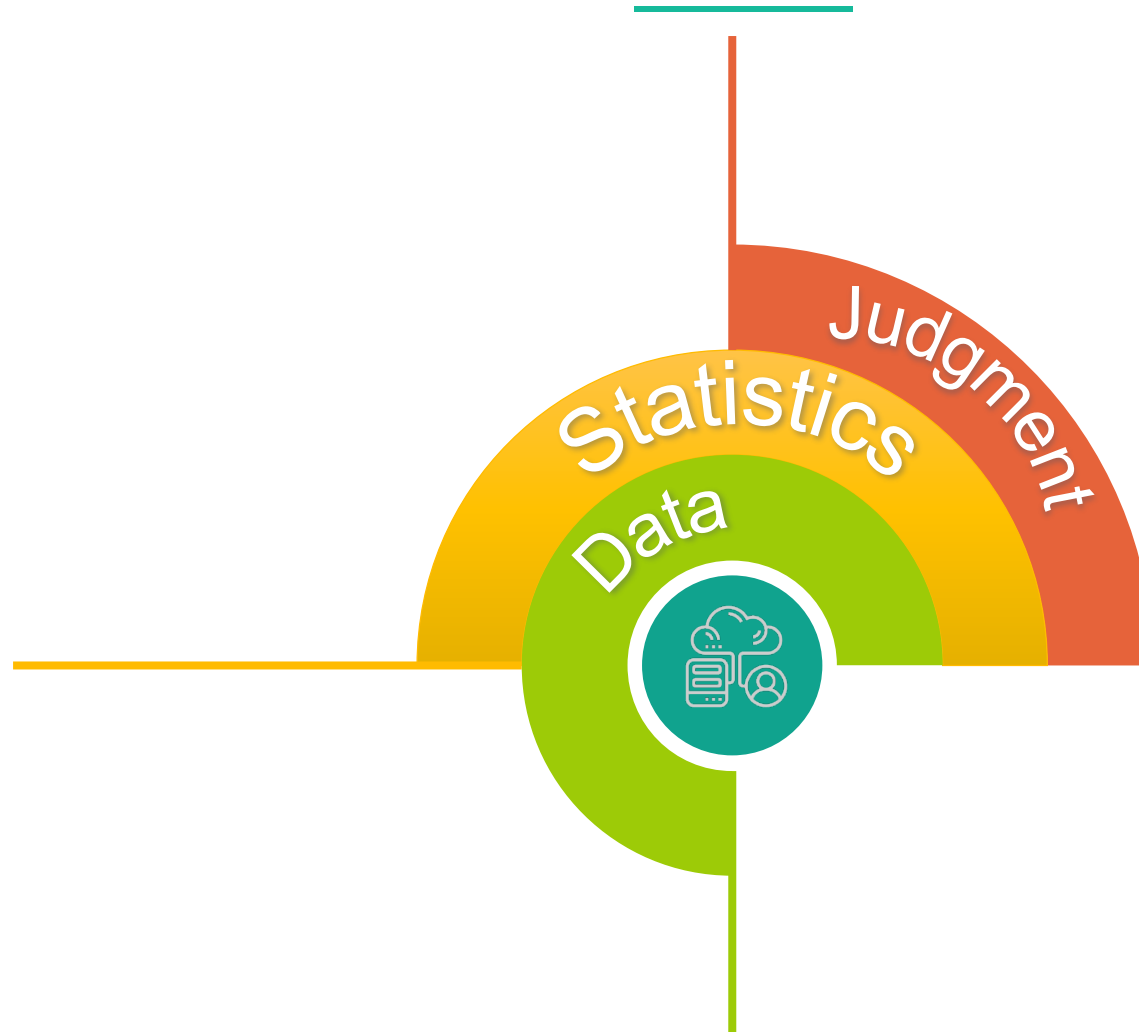
Multi-level Modeling Statistical Methodology

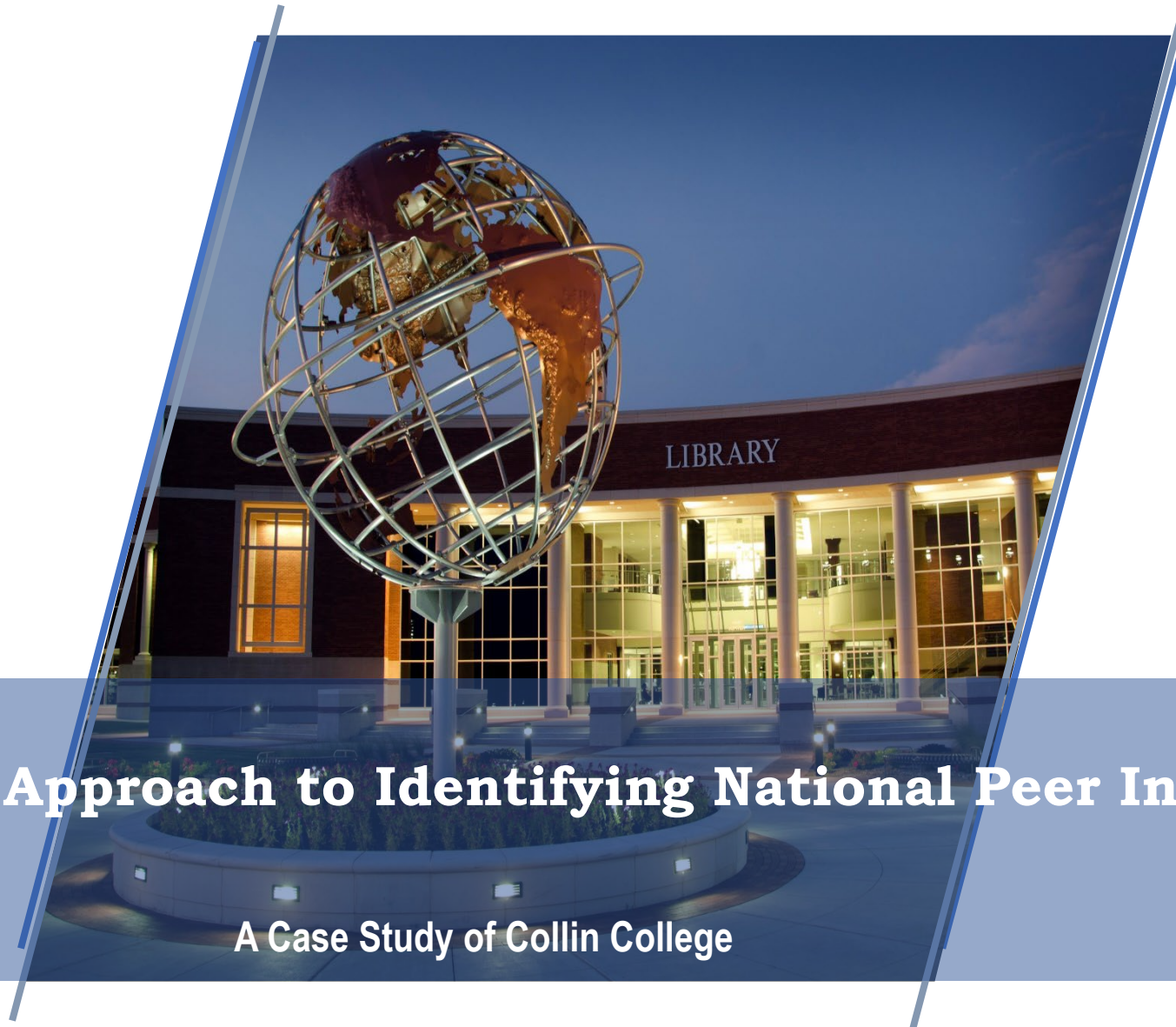
Group Identification

Use a multi-level modeling statistical approach to study group-level (between-group) and individual-level (within-group) emergence of group identification.



Hybrid Approach





A Hybrid Approach to Identifying National Peer Institutions

A Case Study of Collin College

Sources of Comparative Data



Integrated Postsecondary Education Data System (IPEDS)

- Data is collected from all primary providers of postsecondary education. Institutions are required to submit data to IPEDS in order to receive financial aid.
- IPEDS collects data in eight areas: institutional characteristics; institutional prices; admissions; enrollment; student financial aid; degrees and certificates conferred; student persistence and success; and academic libraries, institutional, and human fiscal resources.

The IPEDS database has several data tools:

- College Navigator
- Data Lab
- International Data Explorer
- Search for Public School Districts, Public schools, and Private schools

Sources of Comparative Data

Depending on the institution there are different things to consider when comparing your institution to others.

- 01 Key performance indicators
- 02 Types of degrees awarded
- 03 Economic and Demographic characteristics of your institution
- 04 Size of the institution
- 05 Type of group - Peer, Competitor, or Aspirational

National Peer Institutions - Collin College

The current list of institutions is not a good fit as Collin College started offering baccalaureate degrees and changed classification.

National Peer Institutions 2014

1. Central New Mexico Community College (Albuquerque, NM)
2. Front Range Community College (Westminster, CO)
3. Hillsborough Community College (Hillsborough, FL)
4. Long Beach City College (Long Beach, CA)
5. Montgomery College (Rockville, MD)
6. Oakland Community College (Bloomfield Hills, MI)
7. Pima County Community College (Tucson, AZ)
8. Portland Community College (Portland, OR)
9. Saint Louis Community College (Saint Louis, MO)
10. Salt Lake Community College (Salt Lake City, UT)
11. San Jacinto Community College (Pasadena, TX)
12. Santa Monica College (Santa Monica, CA)

National Peer Institutions - Collin College

IPEDS's filter:

- Public 4-year and Public 2-year institutions.
- Institution size category of 10,000 or higher.
- Highest degree offered Bachelor's and Associate's.
- Carnegie classification: High Transfer, High Traditional and High Transfer: Mixed Traditional/Non-traditional.

The screenshot shows the IPEDS data collection interface. At the top, there are three tabs: "1. Select Institutions", "2. Select Variables", and "3. Output". Below the tabs, it says "My Comparison Institution - None Selected" with an "ADD" button. A question asks "How would you like to select institutions to include in your data file/report?" with four options: "By Names or UnitIDs", "By Groups", "By Variables", and "By Uploading a File".

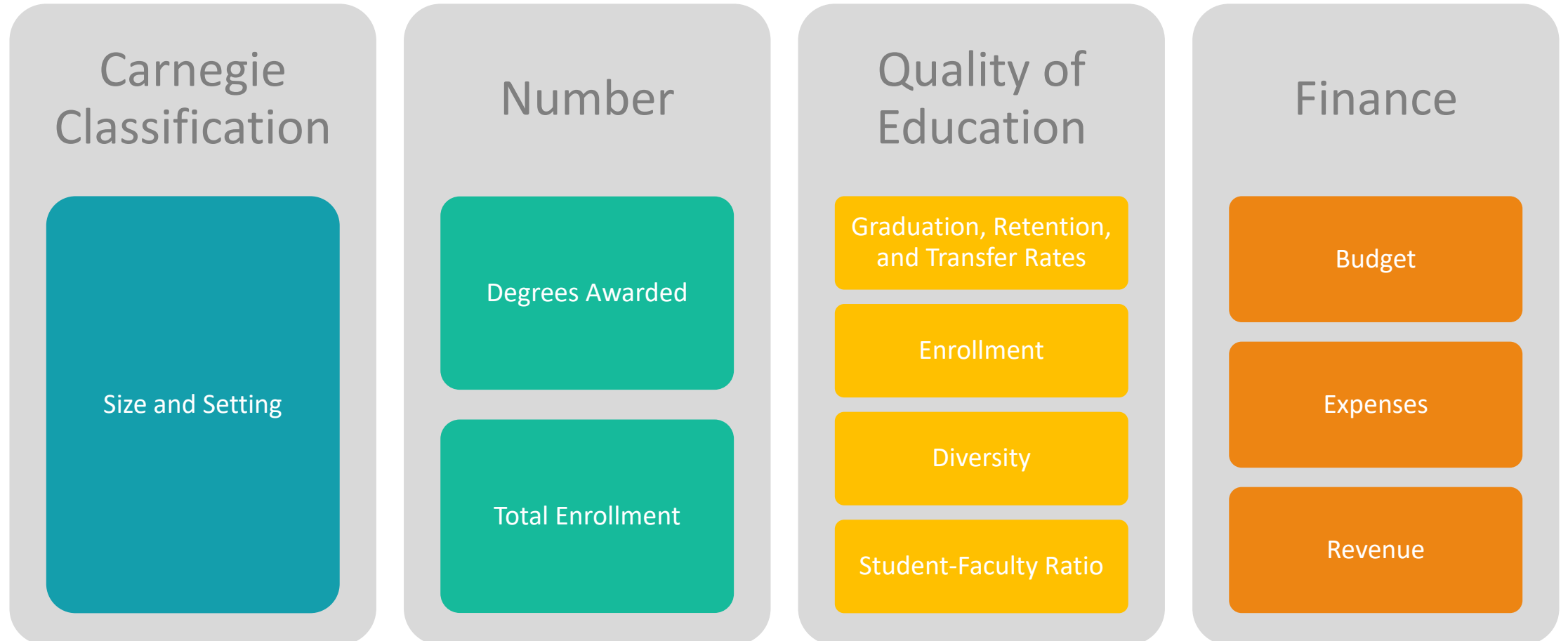
The "Data Collection: 2020" section has a "[change year]" link. A summary box shows "66 institution(s)" with "Clear" and "Search" buttons. Below this are several filter sections:

- Select**: First Look Universe, Title IV participating, U.S. only, All institutions
- Special missions (if any)**: Historically Black College or University, Tribal College, Land Grant Institution
- Special characteristics**:
 - State or other jurisdiction
 - Bureau of Economic Analysis (BEA) Regions
 - Sector
 - Degree-granting status
 - Highest degree offered
 - Institutional category
 - Carnegie Classification 2018: Basic
 - Degree of urbanization (Locale)
 - Institution size category
 - Reporting method (academic/hybrid/program)
 - Has full-time first-time undergraduates
 - All programs offered completely via distance education

The "Criteria Summary" section at the bottom lists the selected filters:

- **Sector**: Public, 4-year or above; Public, 2-year
- **Highest degree offered**: Bachelor's degree; Associate's degree
- **Carnegie Classification 2018: Basic**: Associate's Colleges: High Transfer-High Traditional; Associate's Colleges: High Transfer-Mixed Traditional/Nontraditional
- **Institution size category**: 10,000 - 19,999; 20,000 and above

National Peer Institutions - Collin College



National Peer Institutions - Collin College

Variables

The grouping variables may always be open to dispute and dependent on the purpose of which the classificatory groups are developed.

#	Variable
1	Carnegie Classification 2018: Size and Setting (HD2020), 4 = 2-year large, 5 = 2-year very large.
2	Total 12-month unduplicated headcount (DRVEF122020)
3	Number of Degrees Awarded - Associate's degree (DRVC2020)
4	Number of students receiving an Associate's degree (DRVC2020)
5	Grand total (EFFY2020 All students total)
6	Grand total men (EFFY2020 All students total)
7	Grand total women (EFFY2020 All students total)
8	American Indian or Alaska Native total (EFFY2020 All students total)
9	Asian total (EFFY2020 All students total)
10	Black or African American total (EFFY2020 All students total)
11	Hispanic or Latino total (EFFY2020 All students total)
12	Native Hawaiian or Other Pacific Islander total (EFFY2020 All students total)
13	White total (EFFY2020 All students total)
14	Two or more races total (EFFY2020 All students total)
15	Race/ethnicity unknown total (EFFY2020 All students total)
16	Nonresident alien total (EFFY2020 All students total)
17	Number of programs offered (C2019DEP_RV Grand total)
18	Tuition and fees after deducting discounts and allowances (F1819_F1A)
19	Total operating and non-operating revenues (F1819_F1A)
20	Instruction Salaries and wages (F1819_F1A)

National Peer Institutions - Collin College

Variables

A reduction of the variables is needed before meaningful analysis can be done. In order to reduce our variables we utilized principal component analysis.

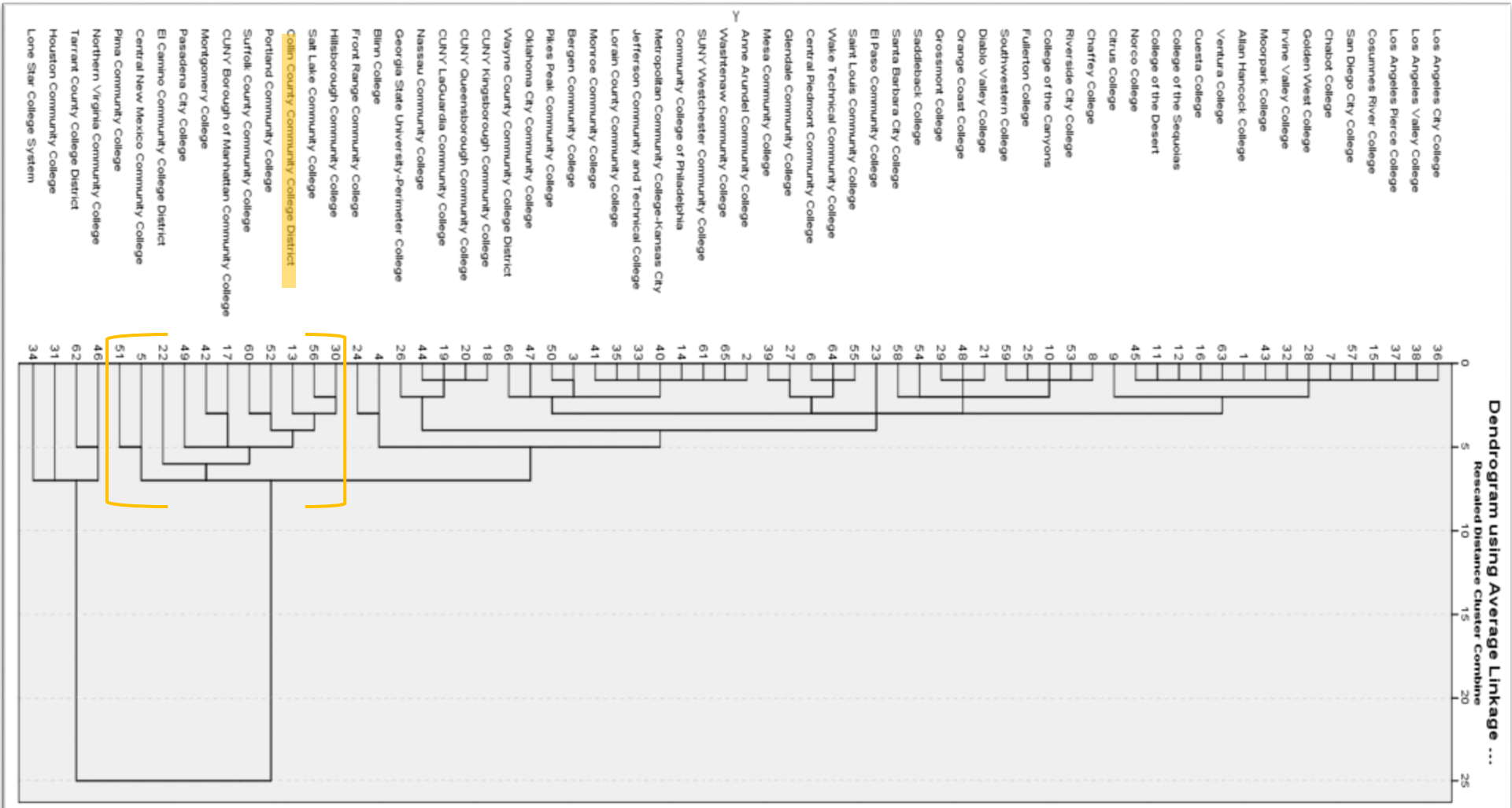
#	Variable
21	Other expenses deductions - Current year total (F1819_F1A)
22	Other expenses deductions - Salaries and wages (F1819_F1A)
23	Total expenses and deductions - Current year total (F1819_F1A)
24	Total expenses and deductions - Salaries and wages (F1819_F1A)
25	Total expenses and deductions - Employee fringe benefits (F1819_F1A)
26	Total expenses and deductions - Operations and maintenance of plant (F1819_F1A)
27	Total expenses and deductions - Depreciation (F1819_F1A)
28	Total expenses deductions - Interest (F1819_F1A)
29	Total expenses and deductions - Other Natural Expenses and Deductions (F1819_F1A)
30	Number of undergraduate students awarded federal state local institutional of grant aid (SFA1819)
31	Percent of undergraduate students awarded federal state local institutional of grant aid (SFA1819)
32	Total number of undergraduates - financial aid cohort (SFA1819)
33	Total enrollment (DRVEF2019)
34	Full-time enrollment (DRVEF2019)
35	Part-time enrollment (DRVEF2019)
36	Transfer-out rate total cohort (DRVGR2019)
37	Core revenues total dollars (GASB) (DRVF2019)
38	Tuition and fees as a percent of core revenues (GASB) (DRVF2019)
39	Student-to-faculty ratio (EF2019D)

Principal Component Analysis Results

Varimax Rotated Factor Loadings (only loadings of .4 or greater reported).

Variable	Students' Component	Tuition Component	Financial Component	Size Component	h^2
Transfer out rate	.72				.74
Full-time retention rate	.67				.87
Part-time retention rate	-.64				.90
Graduation rate	.58			.42	.63
Student-faculty ratio	-.56				.58
Financial Aid		.95	.48		.71
Tuition and fees		.94			.92
Faculty salaries			.87		.88
Other salaries and wages			.84		.49
Revenue			.88		.58
Expenses			-.73		.70
Total enrollment				.79	.87
Full-time enrollment				.68	.76
Part-time enrollment				.82	.73

Hierarchical Cluster Analysis Results



Hierarchical Cluster Analysis Results

Group Mean and Standard Deviations on Four Components.

Factor	Group 1 (<i>n</i> = 4)		Group 2 (<i>n</i> = 11)		Group 3 (<i>n</i> = 25)		Group 4 (<i>n</i> = 10)		Group 5 (<i>n</i> = 26)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Students' Factor	.51	.74	.16	.23	.65	.48	-.65	.53	-.34	.53
Tuition Factor	.23	.76	.54	.39	.21	.52	1.54	.64	-.17	.47
Financial Factor	-.56	.90	-.67	.40	-.42	.54	-.85	.56	-.87	.42
Size Factor	1.76	.53	.49	.50	.77	.37	-.16	.37	.65	.52

Discriminant Analysis Results

Results of Discriminant Analysis.

Step	Factor	Wilk's Lamda	F Ratio	Discriminant Function				
				1	2	3	4	5
1	Students' Factor	.365	56.92*	1.26	.49	.42	-.19	.53
2	Tuition Factor	.074	46.28*	.56	1.23	.10	-.52	-.63
3	Financial Factor	.052	42.76*	.15	-.15	-1.35	-.74	.54
4	Size Factor	.023	34.92*	.37	.91	-.78	1.22	-.67

*All functions statistically significant at $p < .001$.

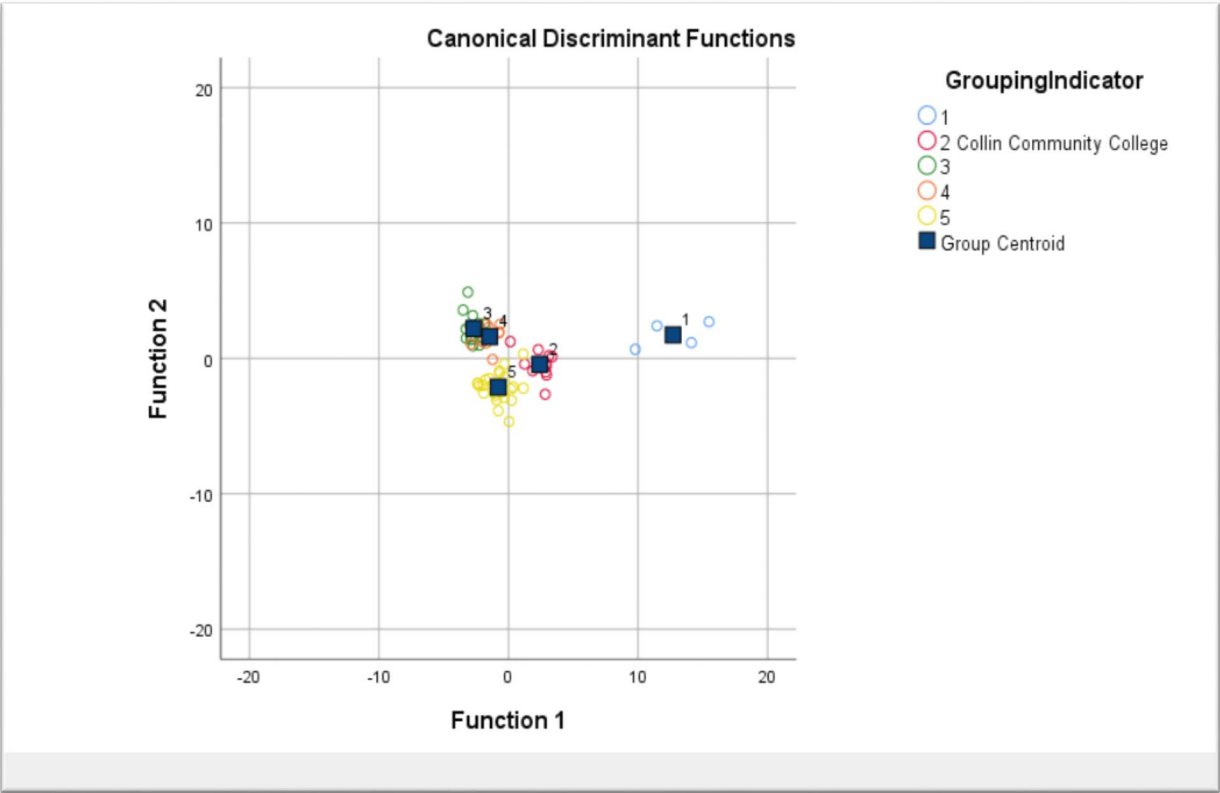
Discriminant Analysis

Group	Institution	Probability
Group 1	Houston Community College	0.00%
	Lone Star College System	
	Northern Virginia Community College	
	Tarrant County College District	
Group 2	Central New Mexico Community College	90.21%
	Collin County Community College District	
	CUNY Borough of Manhattan Community College	
	El Camino Community College District	
	Hillsborough Community College	
	Montgomery College	
	Pasadena City College	
	Pima Community College	
	Portland Community College	
	Salt Lake Community College	
Suffolk County Community College		
Group 3	Allan Hancock College	0.00%
	Chabot College	
	Citrus College	
	College of the Desert	
	College of the Sequoias	
	Cosumnes River College	
	Cuesta College	
	Golden West College	
	Irvine Valley College	
	Los Angeles City College	
	Los Angeles Pierce College	
	Los Angeles Valley College	
	Moorpark College	
	Norco College	
	San Diego City College	
	Ventura College	

Group	Institution	Probability
Group 4	Chaffey College	9.11%
	College of the Canyons	
	Diablo Valley College	
	Fullerton College	
	Grossmont College	
	Orange Coast College	
	Riverside City College	
	Saddleback College	
	Santa Barbara City College	
	Southwestern College	
Group 5	Anne Arundel Community College	0.00%
	Bergen Community College	
	Blinn College	
	Central Piedmont Community College	
	Community College of Philadelphia	
	CUNY Kingsborough Community College	
	CUNY LaGuardia Community College	
	CUNY Queensborough Community College	
	El Paso Community College	
	Front Range Community College	
	Georgia State University-Perimeter College	
	Glendale Community College	
	Jefferson Community and Technical College	
	Lorain County Community College	
	Mesa Community College	
	Metropolitan Community College-Kansas City	
	Monroe Community College	
	Nassau Community College	
	Oklahoma City Community College	
	Pikes Peak Community College	
Saint Louis Community College		
SUNY Westchester Community College		
Wake Technical Community College		
Washtenaw Community College		
Wayne County Community College District		

Discriminant Analysis Results

Centroid of Five Groups



Collin College falls under group 2 along with 10 institutions.

National Peer Institutions - Collin College

National Peer Institutions 2022

1. Central New Mexico College (Albuquerque, NM)
2. CUNY Borough of Manhattan College (New York, NY)
3. El Camino Community College (Torrance, CA)
4. Hillsborough Community College (Hillsborough, FL)
5. Montgomery College (Rockville, MD)
6. Pasadena City College (Pasadena, CA)
7. Pima Community College (Tucson, AZ)
8. Portland Community College (Portland, OR)
9. Salt Lake Community College (Salt Lake City, UT)
10. Suffolk County Community College (Long Island, New York)

National Peer Institutions - Collin College

U.S. Census Data

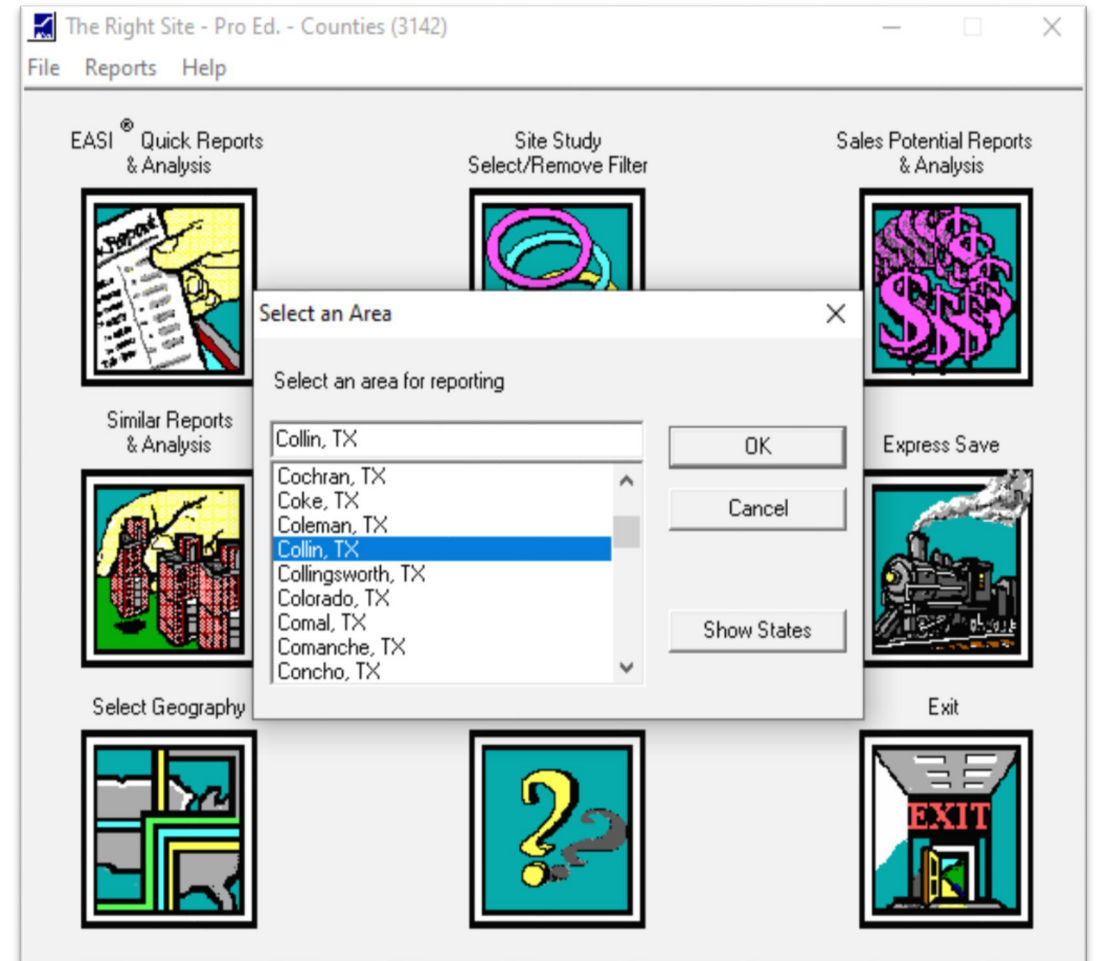
Population and socioeconomic data

Geographical Data

Sources of Data

U.S. Census Data Filter:

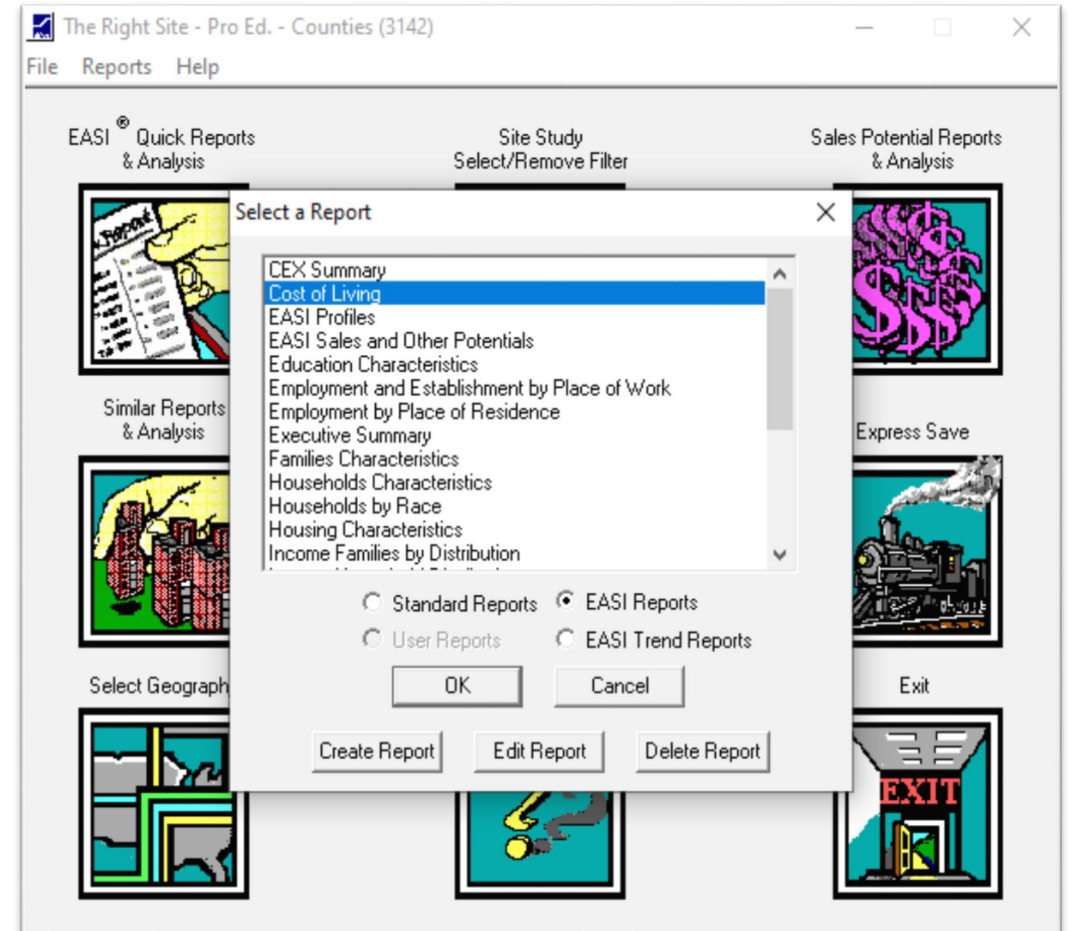
- Extracted 2020 County Data from EASI Analytics “The Right Site Pro”
 - Median Household Income
 - Average Age
 - Average Educational Attainment
 - Crime Index
 - Race
 - Cost of Living Indices
 - All Items



Sources of Data

U.S. Census Data Filter:

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Quick Report: Cost of Living

Description	Value	EASI Score	Rank of 3142
Geographic Descriptors			
County Name:	Collin, TX		
County FIPS Code:	48085		
State Name:	Texas		
CBSA Name:	Dallas-Fort Worth-Arlington, TX		
Demographic Profiles			
Dominant Profile: Median Income Profile			
All Items - CPI (1982-84):	226.1	E	3,098
Apparel CPI:	108.0	E	3,096
Education and Communications CPI:	135.7	C	1,686
Food and Beverages CPI:	252.1	B	685
Other Goods and Services CPI:	391.9	E	3,040
Housing CPI:	215.1	E	3,111
Medical Care CPI:	430.6	E	3,103
Recreation CPI:	111.7	E	3,086
Transportation CPI:	202.0	C	1,841

Report Info: Data (selected), US Share, Area Share, Area Rank

Buttons: Output, Select Report, Go To, Next Record, Prev Record, Cancel, Hint

National Peer Institutions - Collin College

Peers Group – Demographic Data

Institution	Population	Men	Women	Median Age	Median Income	Crime Index	Education Enrollemnt	Cost of Living							
								Apparel	Education and Communications	Food and Beverages	Other Goods and Services	Housing	Medical Care	Recreation	Transportation
Pasadena City College (Pasadena, CA)	10,040,723	51%	49%	35.8	71,659	93	2,570,442	106.9	143.1	255.3	407.7	288.3	471.4	107.2	198.7
El Camino Community College (Torrance, CA)	10,040,723	49%	51%	35.8	71,659	181	2,570,442	106.9	143.1	255.3	407.7	288.3	471.4	107.2	198.7
CUNY Borough of Manhattan College (New York, NY)	1,629,734	47%	53%	37.9		135	330,644	127.2	142.5	260.5	420.2	291.5	476.4	123	214.2
Suffolk County Community College (Long Island, New York)	1,477,528	51%	49%	40.6	115,760	80	366,615	127.2	142.5	260.5	420.2	291.5	476.4	123	214.2
Hilsborough Community College (Hilsborough, FL)	1,473,380	49%	51%	37	67,854	91	377,869	152.5	139	221.1	292.6	216.4	405.2	122.9	192.3
Salt Lake Community College (Salt Lake City, UT)	1,164,021	51%	49%	31.5	77,962	76	339,180	118.7	135.9	254.9	422.5	276.4	479.3	112.8	204.6
Pima Community College (Tucson, AZ)	1,052,466	49%	51%	39.1	60,802	94	272,281	118.7	135.9	254.9	422.5	276.4	479.3	112.8	204.6
Montgomery College (Rockville, MD)	1,051,715	52%	48%	39.5	126,020	123	279,962	155.3	154.2	245	399.9	267.5	445.8	111.9	209.8
Collin College (McKinney, TX)	1,043,748	49%	51%	35.6	109,113	59	299,617	108	135.7	252.1	391.9	215.1	430.6	111.7	202
Portland Community College (Portland, OR)	813,794	50%	50%	36.7	69,904	102	190,988	124	113	236	476.5	275	556	109.2	229.7
Central New Mexico College (Albuquerque, NM)	680,099	49%	51%	37.4	62,704	100	180,083	118.7	135.9	254.9	422.5	276.4	479.3	112.8	204.6

National Peer Institutions - Collin College

Peers Group – Demographic Data

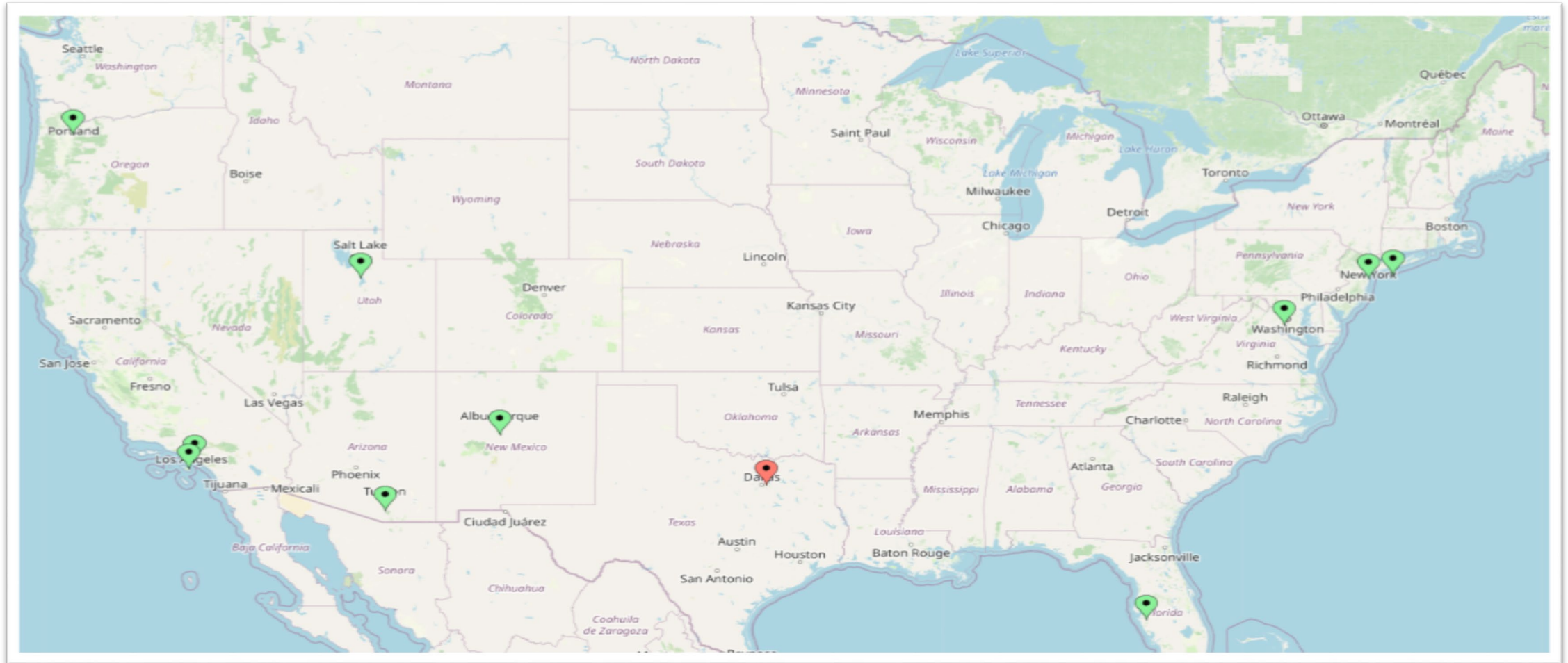
Institution	Ethnicity		Race					
	Hispanic	Non-Hispanic	White	Black	Asian	American Indian and	Other Race Population	Two or More Races
Pasadena City College (Pasadena, CA)	49%	21%	44%	9%	16%	1%	24%	7%
El Camino Community College (Torrance, CA)	49%	21%	44%	9%	16%	1%	24%	7%
CUNY Borough of Manhattan College (New York, NY)	26%	44%	53%	15%	14%	1%	11%	6%
Suffolk County Community College (Long Island, New York)	20%	65%	76%	9%	5%	0%	7%	4%
Hillsborough Community College (Hillsborough, FL)	27%	48%	66%	19%	4%	0%	6%	5%
Salt Lake Community College (Salt Lake City, UT)	19%	68%	73%	2%	6%	1%	12%	5%
Pima Community College (Tucson, AZ)	37%	47%	69%	4%	4%	4%	14%	5%
Montgomery College (Rockville, MD)	19%	40%	49%	20%	17%	1%	8%	6%
Collin College (McKinney, TX)	15%	57%	65%	11%	14%	1%	5%	4%
Portland Community College (Portland, OR)	12%	69%	73%	6%	9%	1%	5%	6%
Central New Mexico College (Albuquerque, NM)	51%	35%	68%	3%	3%	6%	14%	7%

National Peer Institutions - Collin College

Peers Group – IPEDS Data

Institution Name	Location	County	Degree of		Total Enrolled	#Awards	%Enrolled		Student-	Instruct		Grad%	FAFSA%
			Urbanization	#Campuses			Part-time	%Minority*	Faculty Ratio	Exp%	Transfer%		
Collin County Community College District	McKinney, TX	Collin	Suburb: Mid	8	35,132	3,737	69%	44%	25	31%	35	13%	20%
Salt Lake Community College	Salt Lake City, UT	Salt Lake	Suburb: Large	5	29,517	3,229	43%	28%	18	25%	12	27%	25%
Portland Community College	Portland, OR	Multnomah	City Large	4	27,650	3,216	44%	28%	21	24%	20	22%	37%
Pasadena City College	Pasadena, CA	Los Angeles	City Mid	5	26,971	4,167	55%	79%	25	27%	8	37%	60%
CUNY Borough of Manhattan College	New York, NY	New York	City Large	4	25,500	4,748	42%	82%	24	33%	16	24%	73%
Suffolk County Community College	Long Island, NY	New York	Suburb: Large	3	25,230	3,273	45%	40%	23	24%	15	24%	38%
El Camino Community College	Torrance, CA	Los Angeles	Suburb: Large	1	24,223	2,346	50%	67%	29	19%	10	35%	56%
Central New Mexico College	Albuquerque, NM	Bernalillo	City Large	5	23,096	3,829	43%	65%	23	20%	9	29%	39%
Hillsborough Community College	Hillsborough, FL	Hillsborough	City Large	7	22,404	4,035	54%	57%	24	21%	11	33%	53%
Montgomery College	Rockville, MD	Montagomrey	City Small	3	21,260	2,762	55%	64%	17	23%	22	22%	46%
Pima Community College	Tucson, AZ	Pima	City Large	6	19,512	1,997	76%	57%	19	24%	19	21%	37%

National Peer Institutions - Collin College



Map of Collin College Data-Informed Peer Institutions.

National Peer Institutions - Collin College

Panel Review: The final group of peer institutions is usually selected or approved by high-level administrators after more qualitative such as the mission and vision of the colleges.

Community College	Mission	Vision
Central New Mexico College	Be a leader in education and training.	Changing Lives, Building Community
CUNY Borough of Manhattan College	Borough of Manhattan Community College is a diverse teaching and learning community committed to advancing equity and the intellectual and personal growth of students. Working to strengthen a culture of care inside and outside the classroom, we share a passion for learning with students from around the world. We strive to increase degree completion, successful transfer, career achievement and service and leadership within our community, New York City, and beyond.	BMCC will be nationally recognized for improving student learning and success, excellence in research and knowledge creation, and for advancing socioeconomic mobility through the transformative power of education. BMCC faculty and staff are committed to strengthening our culture of care and take responsibility for creating the conditions under which all students can learn and all members of the BMCC community can thrive. Teaching and learning at BMCC, both inside and outside the classroom, is culturally responsive and sustaining, deeply engaging, and celebrates the rich diversity of experience and knowledge that the entire community brings to the College. Our students, faculty, staff, and alumni share great pride for BMCC, and for our role in creating a better, more equitable New York City.
El Camino Community College	El Camino College makes a positive difference in people’s lives. We provide innovative and excellent comprehensive educational programs and services that promote student learning, equity, and success in collaboration with our diverse communities.	El Camino College will be the college of equity and innovation by transforming, strengthening, and inspiring our community to excel through learning.

Limitations

01

IPEDS

Final release data and filter data did not match.

02

Census Data

Census data was not a complete match with data from IPEDS.

03

Cluster analysis

Minimum number of cases. Formann, 1984 suggested the minimal sample size includes no less than 2^k cases (k = number of variables), preferably $5 \cdot (2^k)$.

04

Cluster analysis

Adoption of other clustering approaches may result in somewhat different clustering patterns.

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Questions!

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