

***A PROPOSED METHODOLOGY FOR SELECTING COMPARISON  
GROUPS FOR ARIZONA UNIVERSITY SYSTEM INSTITUTIONS***

Submitted to:

The Arizona Board of Regents

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## ***1.0 Introduction and Overview***

The Arizona Board of Regents (ABOR) is expected to adopt a long-range strategic plan in August 2008 that establishes aggressive goals for the Arizona University System (AUS) to 2020. This plan will encompass targets for the AUS around four key strategic goals; (1) Educational Excellence—relates to degree production needed to be nationally competitive by the year 2020; (2) Research Excellence—relates to building the research infrastructure so that the system gains national prominence by 2020 with the research benefiting the State and improving quality of life; (3) Workforce and Community Engagement--- targets specific kinds of degree production to meet workforce needs and to stimulate demand for more high paying jobs; also service oriented aspects of university missions to the communities; and lastly, (4) Productivity—relates to production of greater numbers of degrees for fewer resources per degree without sacrificing quality.

One of the objectives of the 2020 Vision plan is to define funding adequacy for the AUS in light of the aggressive performance targets established to 2020. The development of a new funding model is seen as a first step towards developing a long-term financial strategy (operating and capital) necessary to achieve 2020 goals and targets. This strategy is expected to account for mission differentiation, academic program mix, cost differences, specific goals and objectives for each university and campus. (see Exhibit 1 below):

### **Exhibit 1 Overview of the Arizona University System**

- University of Arizona
- Arizona State University
  - Arizona State University-Tempe (includes downtown campus)
  - Arizona State University-West
  - Arizona State University-Polytechnic
- Northern Arizona University

As ABOR further develops the system's long-term strategic plan, groups of comparison institutions will be identified for each AUS institution. In July 2008, ABOR contracted with Dr. Daniel T. Layzell to assist in developing a methodology for selecting inter-institutional comparison groups for each of the three public research universities (U of A, ASU-Tempe, and NAU), as well as groups for ASU-West and ASU-Polytechnic. (i.e., five separate comparison groups.) The intended purpose of these comparison groups is twofold: (1) to serve as external benchmarks for institutional and system progress on the various goals and targets set forth in the plan; and (2) to inform development of a new funding model to be used to develop future budget recommendations and identify long-range financial needs projections for the plan to 2020. The remainder of this paper addresses the following topics:

- a brief typology of inter-institutional comparison groups used in higher education;
- suggested guiding principles for this exercise; and,
- the recommended comparison group selection methodology for Arizona's public university system

## ***2.0 A Typology of Inter-Institutional Comparison Groups***

The use of inter-institutional comparison groups is a well-established analytic technique in higher education policy development, implementation, and evaluation. Comparison groups have been used for many purposes, including the following:

- Strategic planning
- Establishing faculty and staff salary benchmarks/goals
- Tuition and fee setting
- State and system funding model development
- Enrollment management/academic program planning
- Benchmarking institutional performance (e.g., performance indicators)

Further, inter-institutional comparison groups have been established to address both single (e.g., faculty salary benchmarking) and multiple purposes.

There are at least four different types of inter-institutional comparison groups that have been used within higher education: competitor, aspirational, predetermined, and peer.<sup>1</sup> Each are briefly described below:

- **Competitor Groups:** This type of group consists of institutions that compete with one another for students, faculty, or financial resources. Because inter-institutional “competition” can occur at many different dimensions, the competitor institutions may or may not be similar in role and scope to the “home institution”.
- **Aspirational Groups:** This type of group includes institutions that are viewed as superior in one or more areas that the home institution wishes to emulate (e.g., academic programs, student quality). Typically, these institutions are not an exact match in role, mission, and scope to the home institution.
- **Predetermined Groups:** This type of group consists of institutions arranged together for some purpose outside of the institution (e.g., an athletic conference, regional compact such as the Southern Regional Education Board, Carnegie Classification) or that are geographically proximate to one another (e.g., within the same state or region of the country). As with competitor groups, these institutions may or may not be similar in role and scope to the home institution.
- **Peer Groups:** This is the only type of comparison group that is purposely structured to include institutions that are similar in role, scope, and mission to the home institution. The peer institutions are chosen based on similarity to the home institution across various dimensions including institutional size, academic program array, control (i.e., public or private), and research emphasis.

It should be noted that none of these comparison group approaches is inherently “better” than the others. Rather, the appropriateness of the approach chosen depends on the purpose(s) for which the comparison group is to be used. The primary purposes for which the five AUS comparison groups are: (1) inform the development of a new funding model and long-term financial projections to 2020; (2) to assess progress in achieving goals and performance targets in the 2020 Vision Strategic Plan; and (3) to inform tuition policy decisions. “Adequacy” in funding for higher education institutions is typically assessed in the context of funding levels at institutions with similar missions, academic program mix, and size – in other words, peer institutions. However, given ABOR’s aggressive performance targets to 2020, it seems reasonable to target a mix of institutions in the development of the comparison groups, with most

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<sup>1</sup> See D.J. Teeter and P.T. Brinkman, “Peer Institutions,” pp. 63 – 72, in The Primer for Institutional Research, M.A. Whitely, J.D. Porter, and R.H. Fenske, eds., Association for Institutional Research, 1992.

as peer institutions, but some as aspirational in nature. Thus, it is recommended that each of the five Arizona comparison groups be composed of ten “peer institutions” and five “aspirational institutions”.

### **3.0 Proposed Guiding Principles**

Despite its acceptance as an analytical technique within higher education, the selection and usage of inter-institutional comparison groups remains both an art and science that requires a mixture of objective statistical analysis, informed professional judgment, and political savvy. Because of this delicate balance, it is important that a set of principles be established at the outset of the study to guide the work of ABOR and AUS institutions in developing comparison group recommendations. Following are five proposed guiding principles, presented in no particular order of importance, that reflect the consultant’s past experience with similar studies:

- ***The process used to develop comparison group recommendations should be collaborative and transparent.*** Given that the resulting comparison groups will be used to inform funding recommendations for the AUS as well as to assess performance toward the objectives of ABORs long-term strategic plan, it is critical that the process for selecting the comparison institutions be as sufficiently collaborative and transparent, involving broad representation from ABOR and institutions from the outset. The methodology should be established by ABOR with input from institutional experts; the comparison groups should be identified by the institutions with input from ABOR. Further, it will be necessary to involve representatives from the Governor’s Office and Legislature in the details of this process. Especially since the funding model review is part of the Lumina grant project awarded to Arizona through the Governor’s Office. It is advisable to share preliminary recommendations with these individuals for review and comment prior to finalizing the peer groups, given their important role in state higher education funding decisions.
- ***The methodology used to develop comparison group recommendations should be simple and straightforward.*** Related to the first principle, it is important that the methodology used to develop the comparison groups be as simple and straightforward as possible. This will contribute to the necessary sense of transparency in the process noted earlier and ultimately enhance the credibility of the results.
- ***The statistical analyses conducted as part of the comparison group selection methodology should be based on reliable and accepted data sources.*** To the extent possible, the statistical analyses underlying the methodology used in this study should be based on standard data sources that are viewed as reliable by professionals in the field to maintain the integrity and credibility of the process. The use of ad hoc or other untested data sources should be minimized.
- ***The comparison group selection methodology used should be rigorous in nature, but flexible enough to allow the application of informed professional judgment in developing recommendations*** While it is extremely important that the methodology used in this study

have strong analytical underpinnings and valid statistical techniques, equally important is the ability to bring informed professional judgment to bear in finalizing recommendations. Even the most accepted statistical techniques or analytic models can sometimes result in one or more institutions that would not be viewed as either credible peers or realistic aspirant institutions when vetted among the higher education community or external audiences.

- ***The comparison groups ultimately selected must have internal and external face validity.*** Finally, given the intended uses of these comparison groups, it is extremely important that they be seen as legitimate comparators for AUS institutions. While there will likely not be 100 percent agreement among the parties involved on all of the institutions ultimately selected, there should be at a minimum general consensus on the groups and methodology used for selecting these groups among ABOR, the universities, and external stakeholders such as the Governor's Office and Legislature. This of course relates to each of the four previous guiding principles.

These suggested guidelines are certainly not exhaustive, and ABOR and institutional representatives may want to refine, delete, and/or add to this list. However, it is important that some set of principles be agreed upon at the outset of this study to help to guide it to a successful conclusion.

#### **4.0 Recommended Comparison Group Selection Methodology**

This section of the paper will present the recommended comparison group selection methodology for Arizona's public universities, including an overview of the recommended methodology, recommended selection parameters, the recommended statistical approach to be used, and other considerations.

#### **4.1 Overview of the Recommended Methodology for Selecting Comparison Groups**

**Overview of Possible Approaches.** The approaches that can be used to select comparison groups range from the **highly quantitative**, based almost exclusively on statistical modeling, to the **highly qualitative**, based primarily on professional judgment. Any approach used has its pros and cons, and it is important to be aware of the appropriate caveats before proceeding.<sup>2</sup>

The *highly quantitative* approach includes cluster analysis and supporting statistical techniques (i.e., factor and discriminant analysis). These techniques attempt to identify a discrete set of cases (i.e., institutions) that are statistically similar in nature with regard to the selection variables used through the application of statistical algorithms. This approach, when correctly used, has the advantage of providing an objective statistical basis for comparison group selection that is relatively free of participant bias. On the other hand, the underlying complexity of this technique makes it difficult to explain and be understood by the broader group of participants and stakeholders in the comparison group selection process, potentially lessening its overall transparency. Further, the proper application of the cluster analysis technique requires the involvement of individuals with an advanced understanding of statistical methodologies that may not be present, or costly to obtain. In addition, if not moderated by some application of professional judgment, such an approach can sometimes result in a set of institutions that, while “similar” to the home institution(s) from a statistical standpoint, lack the internal and/or external face validity noted earlier.

The *highly qualitative* approach relies primarily on the professional judgment of a panel of expert participants (e.g., administrators, staff, faculty) in selecting institutions for a comparison group. Some comparative data may be considered by the group as part of the process, but typically not in a systematic way. The advantage of this approach is that it requires very little technical expertise and can be easily managed. Further, if correctly employed, it can result in a high level of internal and external face validity for the resulting comparison group. The obvious disadvantage of such an approach is that it invites criticism for being overly subjective and biased by those outside of the process, particularly if the

resulting comparison group has a disproportionate number of aspirant institutions, which can negatively impact the face validity of the approach. Further, the absence of a systematic, data-based approach can make it difficult to justify the selection or exclusion of particular institutions in the final comparison group.

Given the various advantages and disadvantages of the more exclusive procedures noted above, it is often advantageous to employ a “hybrid approach” in comparison group selection. The hybrid approach blends systematic data analysis using relatively simple algorithms with a strong emphasis on stakeholder input. In other words, this approach incorporates the strengths of both the highly quantitative and highly qualitative procedures (i.e., systematic data analysis and informed judgment), while minimizing the weaknesses, resulting in a more balanced and credible methodology.

**Recommendation.** The recommended methodology for use in this study is the hybrid approach. Specifically, this incorporates the following four steps:

1. Develop an initial population of institutions to be considered for the five comparison groups based on pre-determined “screening” variables.
2. Further refine the lists of potential institutions to be considered for each of the five peer groups based on the statistical closeness of fit with each of the three public research universities, ASU-West, and ASU-Polytechnic using a set of comparison variables. Weighting should be used to indicate the relative importance of each variable within each of the five comparison groups.
3. After the analyses is complete and the universe of comparison institutions are ranked in order of similarity to the “home” (i.e., AUS) institution, the five institutions are to select 15 comparison institutions as follows:
  - a. Ten institutions should be selected from the ranked lists not to extend beyond the 31<sup>st</sup> ranked institution (i.e. may select any 10 within the 30 most similar institutions ranked by the similarity score).
  - b. Five institutions may be selected from the ranked list not to extend beyond the 51<sup>st</sup> ranked institution (i.e. may select any 5 within the most 50 similar institutions ranked by the similarity score).
4. The final step includes a multi-lateral review of the five proposed comparison groups. All stakeholders will be given an opportunity to review and discuss the five proposed groups.

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<sup>2</sup> Ibid.

All data needed for steps #1 and #2 above are readily available through the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS), which is the recommended data source for this exercise.<sup>3</sup> This methodology is further described in the following sections.

#### **4.2 Recommended Institutional Selection Parameters**

The recommended institutional selection parameters for inclusion in the five comparison groups include two tiers of variables. The first tier includes “screening” variables to develop an initial population of potential peer institutions. The purpose for the initial screening procedure is to limit the universe of potential institutions to a minimum standard of comparability. For this study, it is recommended that these screening variables include institutional “control” (i.e., public or private) and the Basic Carnegie Classification based on the 2005 update to the classification system.<sup>4</sup>

With regard to the “control” variable, it is recommended that the universe of potential peer institutions be limited to public colleges and universities (outside of Arizona), given that one of the primary purposes for the comparison groups is to guide development of a state funding model for the universities. For the Carnegie Classification variable, Exhibit 2 shows the recommended classifications to be included for each of the five comparison groups. The intent of these recommended Carnegie Classifications is to encompass the relevant classification(s) for each AUS institution while also providing a large enough universe of potential institutions from which to conduct step #2 of the methodology.

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<sup>3</sup> IPEDS is administered by the National Center for Educational Statistics. See <http://www.nces.ed.gov/ipeds/>.

<sup>4</sup> For further information on the 2005 update to the *Carnegie Classification of Institutions of Higher Education*, see <http://www.carnegiefoundation.org/classifications/>.

**Exhibit 2  
Recommended Carnegie Classifications To Be Included as Screening Variables**

<b>Comparison Group</b>	<b>Carnegie Classifications Included (2005 Update)</b>
University of Arizona	<ul style="list-style-type: none"> <li>▪ Research Universities – Very High Research Activity</li> </ul>
Arizona State University – Tempe (including Downtown Campus)	<ul style="list-style-type: none"> <li>▪ Research Universities – Very High Research Activity</li> </ul>
Arizona State University – West	<ul style="list-style-type: none"> <li>▪ Master’s Colleges &amp; Universities (Larger Programs)</li> </ul>
Arizona State University – Polytechnic	<ul style="list-style-type: none"> <li>▪ Master’s Colleges &amp; Universities (Medium Programs)</li> </ul>
Northern Arizona University	<ul style="list-style-type: none"> <li>▪ Research Universities – High Research Activity</li> </ul>

The second tier includes four general types of comparison variables for further refining the potential comparison institutions for each group – institutional size, student population, program mix, and research focus. Exhibit 3 presents the recommended comparison variables to be included in this analysis for all five comparison groups (see also Appendix A). Given the different missions of institutions within each of the groups to be established, numerical weights will need to be assigned to each of these variables based on the relative importance of each variable to the mission of the relevant AUS institution. It is anticipated this list will be modified and customized for Arizona based on discussions with the funding model working group led by ABOR. This initial list will provide a basis from which to begin those discussions.

In addition, it is recommended that the underlying data for each comparison variable be based on a three-year average (using the most recent available three years of IPEDS data) to minimize the intra- and inter-institutional impact of year-to-year fluctuations that can occur in the data.

**Exhibit 3  
Recommended Comparison Variables for Group Selection**

<b>Comparison Category</b>	<b>Comparison Variable</b>
Institutional Size	<ul style="list-style-type: none"> <li>▪ Total Headcount Enrollment</li> <li>▪ Total Full-time Faculty Count</li> </ul>
Student Population	<ul style="list-style-type: none"> <li>▪ Undergraduate Enrollment as Percent of Total Headcount Enrollment</li> <li>▪ Full-Time Headcount Enrollment as Percent of Total Headcount Enrollment</li> </ul>
Program Mix *	<ul style="list-style-type: none"> <li>▪ Associates Degrees as Percentage of Total Degrees Awarded</li> <li>▪ Bachelor's Degrees as Percentage of Total Degrees Awarded</li> <li>▪ Graduate Degrees as Percentage of Total Degrees Awarded</li> <li>▪ First Professional Degrees as Percentage of Total Degrees Awarded</li> <li>▪ Degrees in Humanities and Social Sciences as Percentage of Total Degrees Awarded (by level: bachelor's and graduate)</li> <li>▪ Degrees in Education as Percentage of Total Degrees Awarded (by level: bachelor's and graduate)</li> <li>▪ Degrees in Agriculture, Science, Engineering, and Architecture as Percentage of Total Degrees Awarded (by level: bachelor's and graduate)</li> <li>▪ Degrees in Business and Public Administration as Percentage of Total Degrees Awarded (by level: bachelor's and graduate)</li> <li>▪ Degrees in Communications, Visual, and Performing Arts as Percentage of Total Degrees Awarded (by level: bachelor's and graduate)</li> <li>▪ Degrees in Health Professions as a Percentage of Total Degrees Awarded (by level: bachelor's, graduate, and first professional)</li> <li>▪ Degrees in Law (first professional) as a Percentage of Total Degrees Awarded</li> </ul>
Research Focus	<ul style="list-style-type: none"> <li>▪ Research Expenditures as a Percentage of Total Expenditures</li> <li>▪ Ratio of Research to Instructional Expenditures</li> </ul>

\* See Appendix A for a more detailed indication of the program areas to be included.

### **4.3 *Recommended Statistical Methodology***

As noted earlier, there are highly complex statistical techniques that can be employed in narrowing the list of potential comparison institutions using the selection variables outlined in the previous section, which while certainly valid have various disadvantages as well. A less complex, but valid technique that has been used in other comparison institution selection processes is the development of a “similarity score” for each potential institution relative to the home institution. This approach, which is recommended for this study, balances a reasonable level of statistical rigor with relative simplicity and straightforwardness in application and explanation.

A “similarity score” is a composite measure that indicates how closely a potential comparison institution resembles the home institution(s) based on the set of comparison variables employed (i.e., the variables shown in Exhibit 3) and the relative weighting applied to each of the comparison variables. The calculation of the similarity score is accomplished through a series of algorithms that first convert the raw data for each comparison variable to a common metric and then compute the numerical distance between the home (i.e., AUS) institution and each of the potential comparison institutions for each comparison variable. Each comparison variable is assigned a pre-determined numerical weight (where the sum of the weights equals 100) depending on its relative importance to the home institution(s) in identifying a comparison group, and which is applied to the numerical distance calculated earlier. The final step is a summing of the results for each comparison variable to create the composite similarity score for each potential comparison institution. A step-by-step description of this methodology and accompanying example application of it are presented in Appendix B.

### **4.4 *Other Considerations in the Final Selection of Peer Groups***

The final stage of the comparison selection process is perhaps the most important, but also the most difficult and time consuming, involving the evaluation of supplemental statistical and qualitative information, and requiring discussion and a balancing of various factors and professional judgment. While the similarity score methodology described in the previous section will provide five sets of

potential comparison institutions that are reasonably similar to the Arizona universities (based on the selection variables used), the final comparison groups selected should not necessarily be composed of institutions with the lowest similarity scores. As noted earlier, the fact that one potential comparison institution may be more statistically similar to the home institution than another, does not necessarily mean that it is automatically a better candidate than the other. There are other considerations to take into account as well, including other, more qualitative programmatic and mission factors, and the geographic representation of institutions within the comparison groups. This is the rationale for allowing the flexibility for the universities/campuses to select both peers and aspirants within a given range as noted previously.

With regard to the other programmatic and mission factors to be considered, supplemental information should be gathered for each potential comparison institution on specific program array, accreditation status, student characteristics (e.g., ACT/SAT averages for entering freshmen), and the like. Much of this information is available through institutional websites and other publications. Study participants may also be personally familiar with some or all of potential comparison institutions under consideration and be able to bring this information to the discussions regarding their particular comparison group.

It will also be important to ensure a balanced geographic representation of institutions within the comparison groups. Although it is not likely that the refined lists of potential comparison institutions will include representation from all areas of the United States, a primary goal for this study should be to attain some geographic balance, avoiding over-representation from any one particular region of the country (e.g., East Coast, Midwest, West Coast). At a minimum, the final comparison groups selected should include no more than two institutions from any one state.

As noted earlier, given that the selection of the final comparison groups will ultimately be decided through a combination of analysis, professional judgment, and discussion, it will be important that the justification for the selections (and exclusions) be clearly explained to and understood by internal and external stakeholders. As such, it will be useful to share preliminary recommendations for review and

comment with internal constituents and governance groups as well as with external stakeholders in the Governor's Office and Legislature. This has the benefit of bringing a different set of perspectives to bear on the decision-making process as well as contributing to an overall sense of credibility and openness in the process.

## **5.0 Summary and Conclusion**

This paper has outlined a recommended methodology for selecting comparison groups for AUS institutions. A set of five principles is proposed to help guide the study and which stress the importance of collaboration and transparency, simplicity, valid data sources, a rigorous but flexible methodology, and internal and external face validity in comparison group selection. In keeping with these five guiding principles, the recommended methodology is a hybrid approach that blends a statistical approach in first identifying a set of potential comparison institutions with the application of further analysis and professional judgment in selecting the final comparison groups.

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**APPENDIX A**

**RECOMMENDED NCES CLASSIFICATION OF INSTRUCTIONAL PROGRAM (CIP) TITLES  
TO INCLUDE IN PROGRAM MIX COMPARISON GROUP SELECTION VARIABLES**

**Recommended NCES Classification of Instructional Program (CIP) Titles to Include in  
Program Mix Comparison Group Selection Variables  
(Based on 2000 CIP Classifications)**

Program Group	Related CIP Title and 2-Digit Code
Humanities and Social Sciences	<ul style="list-style-type: none"> <li>▪ Area, Ethnic, Cultural, &amp; Gender Studies (05)</li> <li>▪ Foreign Languages, Literatures, &amp; Linguistics (16)</li> <li>▪ English Language &amp; Literatures/Letters (23)</li> <li>▪ Liberal Arts &amp; Sciences, General Studies &amp; Humanities (24)</li> <li>▪ Multi/Interdisciplinary Studies (30)</li> <li>▪ Philosophy &amp; Religious Studies (38)</li> <li>▪ Theology &amp; Religious Vocations (39)</li> <li>▪ Psychology (42)</li> <li>▪ Social Sciences (45)</li> <li>▪ History (54)</li> </ul>
Education	<ul style="list-style-type: none"> <li>▪ Education (13)</li> <li>▪ Family &amp; Consumer Sciences/Human Sciences (19)</li> <li>▪ Parks, Recreation, Leisure, &amp; Fitness Studies (31)</li> </ul>
Agriculture, Science, Engineering, & Architecture	<ul style="list-style-type: none"> <li>▪ Agriculture, Agricultural Operations, &amp; Related Sciences (01)</li> <li>▪ Natural Resources &amp; Conservation (03)</li> <li>▪ Architecture &amp; Related Services (04)</li> <li>▪ Computer &amp; Information Sciences &amp; Support Services (11)</li> <li>▪ Engineering (14)</li> <li>▪ Engineering Technologies/Technicians (15)</li> <li>▪ Biological &amp; Biomedical Sciences (26)</li> <li>▪ Mathematics &amp; Statistics(27)</li> <li>▪ Physical Sciences (40)</li> <li>▪ Science Technologies/Technicians (41)</li> </ul>
Business & Public Administration	<ul style="list-style-type: none"> <li>▪ Security &amp; Protective Services (43)</li> <li>▪ Public Administration &amp; Services (44)</li> <li>▪ Business, Management, Marketing, &amp; Related Support Services (52)</li> </ul>
Communications and Visual & Performing Arts	<ul style="list-style-type: none"> <li>▪ Communications, Journalism, &amp; Related Programs (9)</li> <li>▪ Communications Technologies, Technicians, &amp; Support Services (10)</li> <li>▪ Visual &amp; Performing Arts (50)</li> </ul>
Health Professions	<ul style="list-style-type: none"> <li>▪ Health Professions &amp; Related Clinical Sciences (51)</li> </ul>
Law	<ul style="list-style-type: none"> <li>▪ Legal Professions &amp; Studies (22)</li> </ul>

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**APPENDIX B**

**DESCRIPTION AND EXAMPLE APPLICATION OF RECOMMENDED  
COMPARISON GROUP SELECTION STATISTICAL METHODOLOGY  
("SIMILARITY SCORES")**

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## Overview of the Recommended Methodology For Computing “Similarity Scores”

The methodology for computing composite “similarity scores” for the potential comparison institutions for developing each of the five groups includes four steps as noted below:

1. **Convert the raw peer selection variable data to a common metric.** The first step is to convert the different values underlying the various selection variables to a common metric for each Arizona public university/campus and their potential comparison institutions. For each comparison selection variable, a “z-score” can be calculated for each institution by subtracting the mean value for all institutions in the data array from the institutional value and dividing by the standard deviation of the data array (*see example Steps 1a and 1b on pp. B-4/B-5*).
2. **Convert the z-scores to “comparison scores”.** The next step is to create a set of “comparison scores” for each potential comparison institution by taking the absolute value of the difference between the z-score for each selection variable and that of the relevant Arizona public university/campus (*see example Step 2 on p. B-6*).
3. **Standardize the comparison scores and apply weighting factors.** The third step of the methodology is to standardize each institution’s comparison score for each selection variable using a formula  $X = 10 + 5C$ , where “C” is the comparison score.<sup>5</sup> This formula does not change the relative position of a potential comparison institution vis a vis the relevant Arizona public university/campus, but enhances the visual presentation of the data by distributing the scores over a broader range. The pre-determined weights for each selection variable should be applied to the standardized comparison scores (*see example Step 3 on p. B-7*).
4. **Create a composite “similarity score” for each institution.** The final step is to compute a composite “similarity score” for each potential comparison institution by summing the weighted standardized comparison scores for each selection variable and then rank-ordering the institutional scores from lowest to highest. The lower the composite score an institution has, the more similar statistically it is to the relevant Arizona public university/campus. Again, the refined sets of potential comparison institutions should include the top 50 institutions (*see example Step 4 on p. B-8*).

As noted earlier, while the similarity score methodology will provide a set of potential comparison institutions for each AUS institution, the final comparison groups selected should not necessarily be composed of institutions with the lowest similarity scores. The fact that one potential comparison institution may be more statistically similar to the home institution(s) than another, this does not necessarily mean that it is automatically a better candidate than the other. There are other considerations to take into account as well, including other, more qualitative programmatic and mission

factors, and the geographic representation of institutions within the comparison groups. This is the rationale for allowing the flexibility for the universities/campuses to select both peers and aspirants within a given range.

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<sup>5</sup> See “Appendix VI: University of Toronto Peer Selection Process,”  
<http://www.library.utoronto.ca/president/final/append6.htm> (accessed on February 5, 2004).