

University of Minnesota Morris Digital Well  
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Planning Committee

Campus Governance

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## Planning minutes 04/11/2012

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**Planning Committee**  
**April 11, 2012**

Present: Jim Barbour, Julie Eckerle, Ken Hodgson, Arne Kildegaard Jane Kill, Margaret Kuchenreuther, Leslie Meek, Josh Preston, Lowell Rasmussen, James Rook, Jordan Wentz

Guests: Peter Radcliff, Office of Planning and Analysis  
Daniel Jones-White, Office of Institutional Research  
Bart Finzel, Nancy Helsper, Jacquie Johnson, Colleen Miller, Sandy Olson Loy

Margaret introduced Peter Radcliff and Daniel White with a brief explanation of the importance of the information they are presenting to this committee and the committee's charge (identifying the "Morris 14.")

Peter Radcliff began the presentation by explaining how it is important for all the campuses in the Minnesota system to have a common way of looking at other higher education institutions across the United States and thinking of ways to process and identifying comparison institutions what we have done is to do help find the background needed to do an analysis of how the landscape appears, find the patterns and then provide that information to each institution to help inform the process. This process will enable looking at various institutions across the United States which may be over looked save for this process. Institutions change/shift over time and with this process we are able to keep up with changes. An example of this is the University of Florida. A few years ago the enrollment of this school was ...play with weights etc.

Daniel Jones-White from the Office of Institutional Research is responsible for making this model. 2010 IPEDS data was used for all references. All 4 year degree granting not for profit baccalaureate and above institutions in the United States collected data on 14,701 institutions...as much data as possible. However, public and private sector institutions have different ways of collecting and reporting financial data. They were able to grab a series of data and made a strong assumption of what the private schools were reporting were similar to the data the public institutions reported. This is built into the model. There were 200 variables provide by IPEDS that were pulled for the information. The various variables are still intact so if it other data is needed check variables that is still possible. Need to scale the list down. To begin the variable narrowing process each variable was given a code...each had to have less than 10% missing cases, and variables where 0 or none were indicated gave inverse option...i.e....where 0 African Americans were listed this became % of white students instead. And kept as much of that data as possible. Also, a correlation analysis to make sure variables were not doing the same thing given a <0.9 and generally one or the other were stripped out. And couldn't have any linear combination data...i.e. couldn't have number of undergraduate students, number of graduate students and total students all in the model at the same time. This is because they are in perfect relations to form the other one. Do we want to think of things in total or do we want to break things out in order to make appropriate decisions for the model.

Had a consultation and feedback session during the visit to Morris in December and also a visit to Duluth. (Please see attached document to follow along.) 32 variables were used in the model the first block pertains to degree information (baccalaureate, masters, PhDs both research and professional, and information regarding undergraduate enrollment. % of total enrollment of women and % total enrollment of white and % of undergraduates-first time-full time-degree seeking students)as issues of access were important (almost all institutions have white and women students) also have expenditure data (variables include: instructional expenditures—FTE; research expenditures—FTE; Public Service expenditures—FTE; academic support expenditures—FTE; student services expenditures—FTE instructional support expenditures—FTE; 4 yr. and 6yr graduation rates; instruction, research & public service—FTE (which help estimate size); executive administrative staff—FTE ; professional & non-professional staff—FTE; 3 variables for average professor salaries (9 mo. contract pool for professors, associate professors and assistant professors) 2010-2011 tuition/fees; percentage of students admitted; admission yield student-faculty ratio; student ratio of first time full time students; full time students/traditional what percentage is transfer students; what percentage undergraduates need/receive financial aid; what percentage undergraduates receive institutional aid; percentage of undergraduates seeking degrees in the STEM field; what percent undergraduates seeking degrees in the Liberal Arts Field; part time--full time ratio. This is the list of 32 variables available to work with. Which will help decide which institutions are similar and those that are different? There is still a lot of data information. So needed to find a way to utilize the information and transform it into something that is more meaningful. This was accomplished with a common factor analytical approach. Essentially the data was analyzed and looked for underlying commonalities between different data elements. By doing this is allows you to group things together into factors. Similar to latent variable approach. Talk about test scaling...this is the same sort of element they use to identify how much a student knows about mathematics this is what we are

doing with institutions gathering underlying factors which describes institutions in a sort of multi-dimensional space

Exploratory common factor analysis principal axis factoring (trying to identify common factors) so just explaining where we see commonalities between data elements with oblique rotation which means when identifying our factors we will allow them to be correlated so we don't think any of the factors are independent of others ...so factor 1 can be related to factor 2 came up with a 7 factor solution where we see common factors between elements which accounts for over 2/3s of the original data variance set...we can reframe the 32 data elements into 7 factors and they retains the information there and still allows for the large proportion of variance in the data set (we need to remember it is easier to remember 7 factors are easier to understand, remember and summarize than 32

Hope this gives you a sense of what the different factors are and how we arrived at this point.

#### Factor 1

Places emphasis is on the variables related to a size of an institution...PhDs granted, Master Degrees granted, Bachelor Degrees granted, FTE—Executive staff, FTE—Professional, FTE--Instruction Research and Professional Staff, FTE--Non-professional staff, and public service expenditures. All define the first element.

Individually these do not give enough information to relate to the size of an institution, but together they give a better idea of the size of an institution. Positive values would be larger institutions across these elements and those with negative values would be smaller institutions.

#### Factor 2

Is based on the tuition and fees of an institution, percentage of undergraduates receiving institutional aid, as well as the selectivity or admissions yield...Daniel has entitled this the High Tuition/High Aid factor. This factor identifies the dimension of institutions that on the positive end are highly selective, have high tuitions and give the students lots of aid and those with negative values are less selective, lower tuition and fees, and less aid for students.

#### Factor 3

This is the access question. This includes the percentage enrollment of white students, percentage of undergraduate students that receive federal aid and both the 4 and 6 year graduation rate. There is an inverse between the percentage students that are white and the percentage of students that are getting federal grant aid. Which in our spsocial economics and race are highly correlated.

#### Factor 4

This includes the faculty salaries. This includes full professor salaries, associate professor salaries, assistant professor salaries and full time retention rate. Institutions with high professor salaries are going to show a negative score and institutions with lower salaries will show a positive score.

#### Factor 5

This is the area that is liberal arts area verses STEM dimension. In one direction you have the undergraduate degrees in the STEM field and going in sort of the opposite direction is the field of liberal arts field and the percentage of students that are women. We know that the number of women in the STEM field is relatively low. A positive value would indicate a higher emphasis on the liberal arts area and a negative value would place a higher emphasis on the STEM area (Science Technology, Engineering and Math.)

#### Factor 6

This is the "non-traditionalness" of the student body. Here the graduate student to undergraduate student and the 2 variables which look at the first time/full time ration, as well as the part-time to full time ratio, so the values that are positive on this dimension would have a high percentage of non-traditional student body. Which would mean a large portion of the student body are not first time/full time students. It also means there would be a higher transfer student ratio. A negative value on this would be a more traditional campus.

#### Factor 7

This is the more instructional expenditure area. There are 7 variables which include expenditures for FTE variables as well as the student-faculty ratio and percentage of admitted variable. This one where institutions that spend more would have a positive value and institutions what spend less would have a negative value.

Now that the 7 dimensions/factors have been identified we can take the factor loadings and multiply them by values for each institution and then identify the distribution of the institutions along this dimension.

(See Factor 1: Institutional Size in attachments)

Here distribution is skewed to the left. There are a few institutions that are really large. The last one is Ohio State University. The University of Minnesota is not far behind it, just under the "6" point. And you can also see that the University of Minnesota Morris is identified by the hash mark. In terms of the size of the campus it comes in below the mean (0) and this identifies Morris as a smaller campus. There is a high concentration of campuses that are similar in size to Morris.

Factor 2 is a "bi-noodle" showing the cost dimension. One side clearly indicates the private, highly selective, high cost, high aid institutions; the other side institutions, public institutions low cost, little aid that go into these institutions

Factor 3 shows student access. Look at the axis factor which are now more normally distributed. This shows Morris is slightly below the mean. The negative means compared to the national average of four year institutions there are higher percentage of white students and lower percentage of students receiving institutional aid. Minnesota lacks from a large diversity pool.

Factor 4 looks at the faculty salary range. Morris is slightly above the mean. But this also incorporates institutions that are poorer regions, i.e. Alabama. IPEDS doesn't include cost of living it just uses the figures entered.

Factor 5 Liberal Arts/STEM dimension A few schools on this one are heavily focused on the STEM, not sure which institutions these are, but mostly Georgia Tech, Purdue, and institutions which are highly focused on math and engineering skills.

Factor 6 is Non-traditional as well as Factor 7 Expenditures.

What happened was we began with 32 variables (where each institution has received a score on each different factors) and brought down to 7 factors. Now from this we can calculate different scores. And now that each institution has a different score, we can difference them to see how far they are from each of the other institution on the seven dimensions. We subtract the University of Minnesota Morris' score from each of the other institution dimensions. Morris shows up as having zeros across the board as Morris is perfectly equal to itself. Then you can start to calculate how far an institution is from Morris. You can see that on the first dimension, which is size (again look at the attachments EACH INSTITUTION HAS SEVEN FACTOR SCORES,) the University of Minnesota Twin Cities is a lot bigger than Morris. This is nothing new or unknown. This just demonstrates what it is that we able to do once a series of factor scores, it is possible to use those scores to see how far each of these institutions are from Morris. Once the calculation has been done an overall score can be calculated. To do this we take each of the different scores and square them, and then we sum them, which gives us the total difference across all seven dimensions.

Look view attachments

Table 1 the 7 factors are listed across the top. This table show the University of Maine, Farmington has an overall score of 0.376 which is pretty close to UMM. Compare this to Carleton College, which has an overall score of 10.344, which of course means it is much farther away. The last column gives each institution a ranking. Carleton's ranking indicates there are 1043 institutions across these 7 factors/dimensions closer to Morris.

Table 2 factors the scores for the current institutions in the COPLAC group.

Table 3 lists UMM's nearest 93 institutions. This list includes both public and private institutions

Peter Radcliff continues here.

This hopefully gives us a way and a sense of the breadth of institutions which Morris falls compared to other institutions. It also gives the updated scores/status of current Morris 14 comparison group as well as the COPLAC set and where they fall in this distribution. It hopefully gives different views of institutions which weren't in contention before, but could possibly be now, whether in addition to or in place of current institutions

There are a couple of different ways to work with this data.

- 1) Use the overall 7 dimensions and calculate the overall distance for currently they are all weighted equally. Though this could be adjusted easily given variables....one way would be to adjust the weight for certain variables (there are probably certain factors which some might deem more important than others). This would alter the distances. This would also put more emphasis on some rather than others and would generate a different list of institutions which may be closer to Morris out of this collection.
- 2) Bringing in additional contextual institutional information which might be relevant.

Some of the things that we currently have in this spreadsheet to look at are region, sector, the public/private variable, Carnegie classification (groupings of similar institutions) and using a different set of rules.

(Daniel Jones-White) For example, there are many east coast liberal arts schools and Morris doesn't really think of them as its peers. So limits would be put on institutions in the Great Lakes as well as the Plains for geographic values. This would then set the region for the Midwest as well as the Ohio area, part of Pennsylvania. The filter could be set to exclude all institutions except for those schools in the specified geographic area. Also, we can specify no privates, only public institutions, and that would produce a new list. It keeps the same scores, but filters out other information we might not want. We could also use the Carnegie classification (as Carnegie has the 5 different institutional emphases variables) or any of the descriptor information that is in IPEDS should be in this data set and allow you to refine the list to approach the list we are trying to produce.

Margaret:

What seems to me might make sense is if a school comes up close to Morris with many of the filters, then it might be a strong contender for the list.

Daniel:

Another way to think of that is to also look at the 7 factors. This should be achieved with the overall scores. But you might want to make sure that if an institution is close on everything across the 7 factors, you might want to look at that institution.

Peter:

You can kind of see that with the list for the Morris 14 in COPLAC, that the positions on each one of the dimensions listed and compare those to Morris. We provided just the values on those opposed to the distance, so you can see how similar those institutions are on the various different dimensions. And obviously that can be done for any institution.

As you are thinking through what kinds of questions matter, we can work through some interactively here, or as your leisure as well. You can think of different ways of filtering the data and see what that produces.

Arne:

So I think this issue as you have all 7 factors weighted equally is huge and any index numbers vectors I have to think more about have a strong impact about eventual rankings One question I am really curious about now I see these are put together what use are we going to put this data to? In one way the question/answer is already imbedded, so for instance if we wanted to know if we are appropriately staffed in this part of our operations, we look to the comparison group, but as the group been chosen to be very close in the first place, then what use is it if we already know that? .....making of the formula

A couple ways to think about that

1) Certainly as you think about the dimensions and what matters there and you want to think about the faculty salary dimension and want to think about salaries at Morris more appropriate for the kind of institution it is you can essentially ignore that dimension and look at how similar you are to schools in the other ones and then see what the difference in the salaries are at that point

2) The other point is if you look at these over time for instance if you set a group of institutions which are highly similar in the dimensions and 5 years later we look at where they are (faculty salaries, graduation rate etc.) radically different than the group. Something has happened, either the comparison group has moved or Morris or some other factor.

We have been trying to determine just how old the current Morris 14 is. We are not quite sure. But we are thinking it is relatively old. Over time the institutions have changed. We thought about the pattern over the whole sweep of time for the comparison group has probably had movement in one way or another.

Arne:

One thing that never shows up in data is what it is you are trying to accomplish. What is the actual mission of the project. It seems to me that that would be the most important comparison. So when I look at this generated list of colleges, I don't see for example colleges that have

