Decision Analysis Group Project

SYST-573-003

Spring 2023

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GEORGE MASON UNIVERSITY

Project Outline

Step	Goals
Planning meeting with project team	Identify problem to solve and contact DM to confirm participation
Meeting 1 with DM	Ensure that all team members understand the problem and that the team has sufficient information to proceed.
Project team work	Gather data for alternatives and create the affinity diagram
Meeting 2 with DM	Perform the elicitations and complete the model.
Project team work	Calculate SDUF and utility rankings
Meeting 3 with DM	Explain the results and offer recommendations.

Project Plan

- **Team Members:**
  - Mitch Breeden
  - Gregg Rich
  - Micaela Teets
  - Henry Wu

- **Decision Maker:** Virginia High School Senior looking to choose a university

- **Tools**
  - Logistical Decisions for Windows
  - Affinity Diagram
  - Single Dimension Utility Functions
  - Elicit weights by rank sum and trade-off methods

Goal Definition

- To choose the best university for a middle-class high school senior from Northern Virginia who intends to pursue a math degree (but may opt for CompSci double major) at one of the four schools that accepted him for admission.

School Alternatives

- Rochester Institute of Technology
- University of Michigan – Ann Arbor
- Georgia Tech
- Virginia Tech

Alternative 1: Rochester Inst. of Technology

Objective:	**Measure**
• Accessible professors 11:1	Student/faculty ratio
• Research opportunities $56,043,000 / 246,227 ft²	R&D budget / research space
• Affordability $52,030	Tuition + costs after aid
• Campus life 12,122	School size (exponential)
• Student support	Grad rate / job placement 71% / 9[illegible]%

RIT

Alternative 2:
University of Michigan – Ann Arbor

Objective:	**Measure**
• Accessible professors 4:1	Student/faculty ratio
• Research opportunities $1,640,000,000 / 1,882,059 ft^2	R&D budget / research space
• Affordability $52,266	Tuition + costs after aid
• Campus life 29,581	School size (exponential)
• Student support	Grad rate / job placement rate

Alternative 3: Georgia Tech

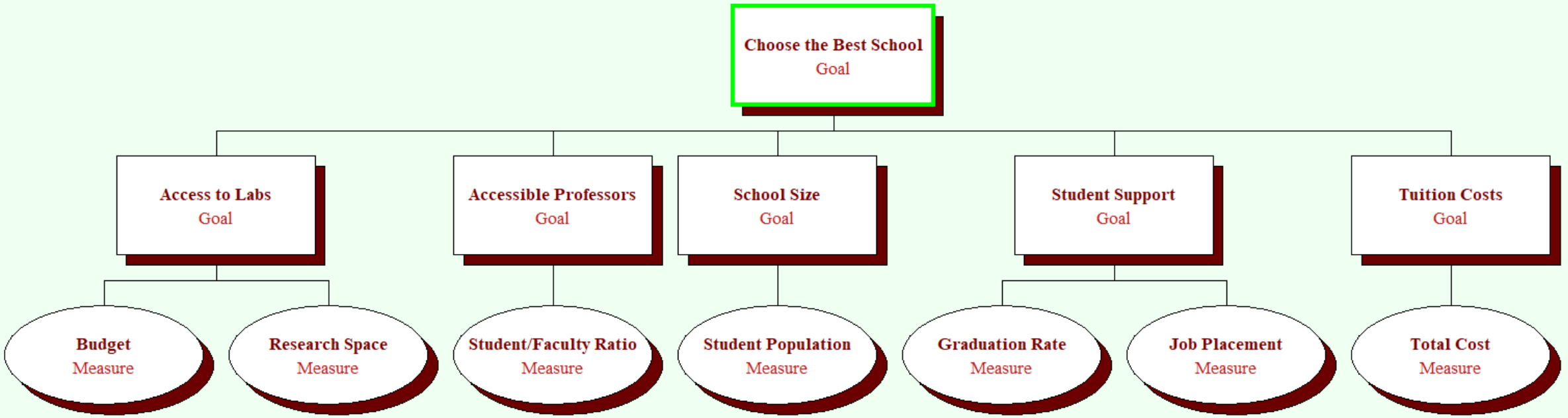
Objective:	Measure	
• Accessible professors	Student/faculty ratio	12:1
• Research opportunities	R&D budget / research space	$1,114,481,000 / 2,686,931 ft^2
• Affordability	Tuition + costs after aid	$33,964
• Campus life	School size (exponential)	14,485
• Student support	Grad rate / job placement rate	91% / 95%

Georgia Tech

Alternative 4: Virginia Tech

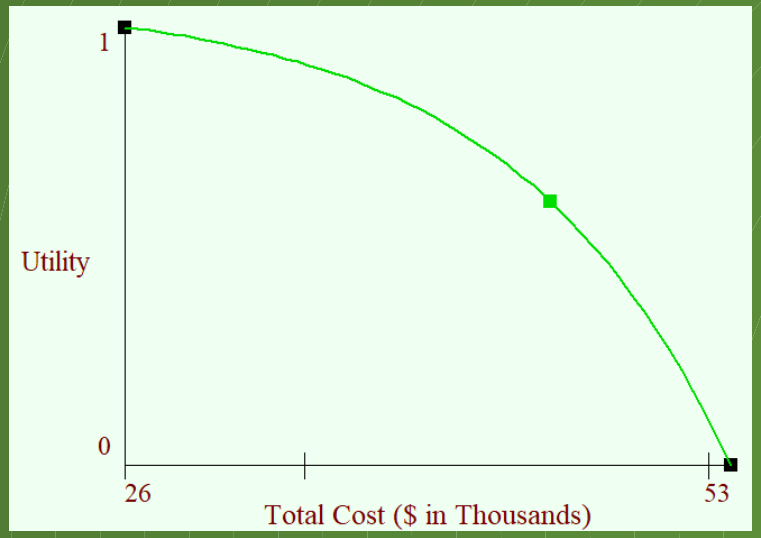
Objective:	Measure		
• Accessible professors	Student/faculty ratio	13:1	
• Research opportunities	R&D budget / research space	$542,045,000	/ 1,658,510 ft^2
• Affordability	Tuition + costs after aid	$20,247	
• Campus life	School size (exponential)	29,112	
• Student support	Grad rate / job placement rate	86%	/ 96%

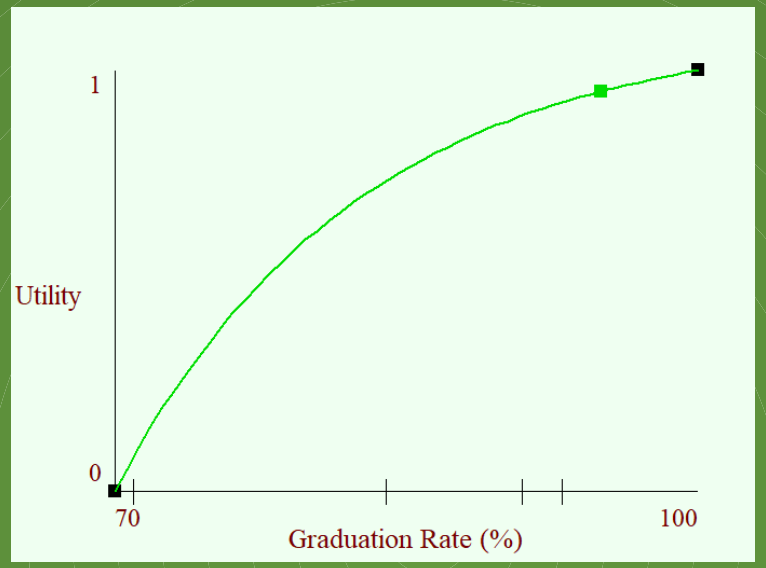
Affinity Diagram

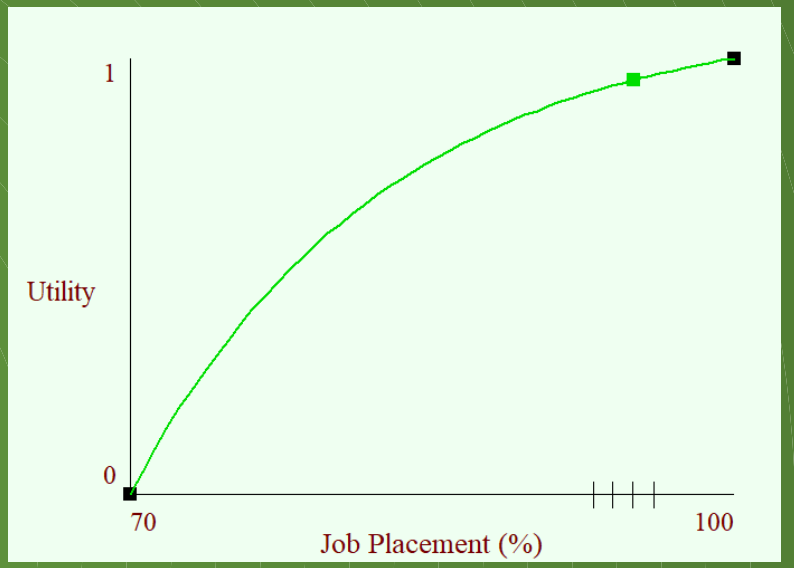


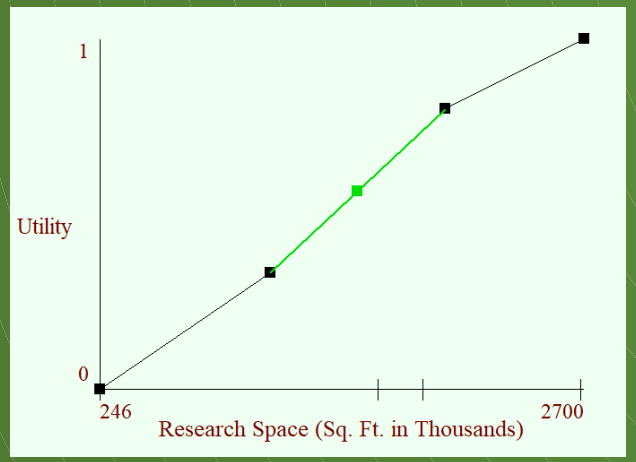
Preference Set = BEST.SCHOOL.PREF

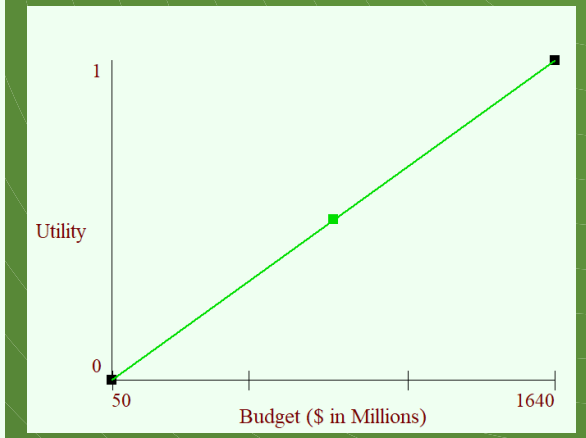
Single Dimensional Value Functions

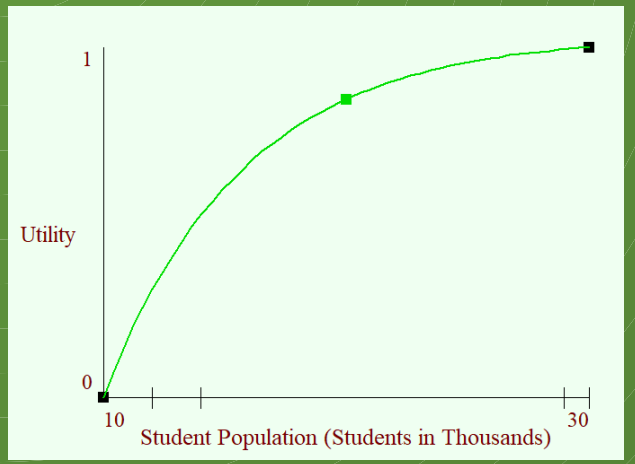


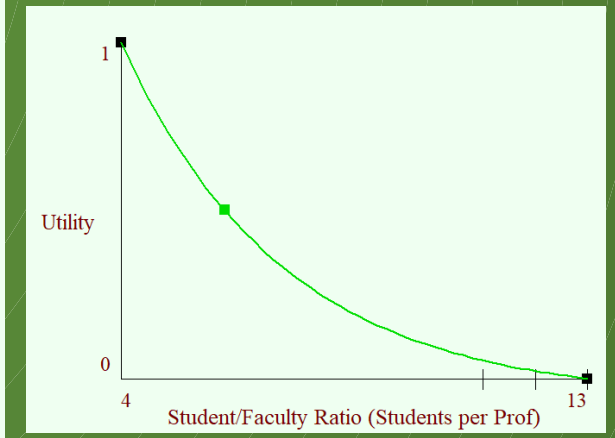












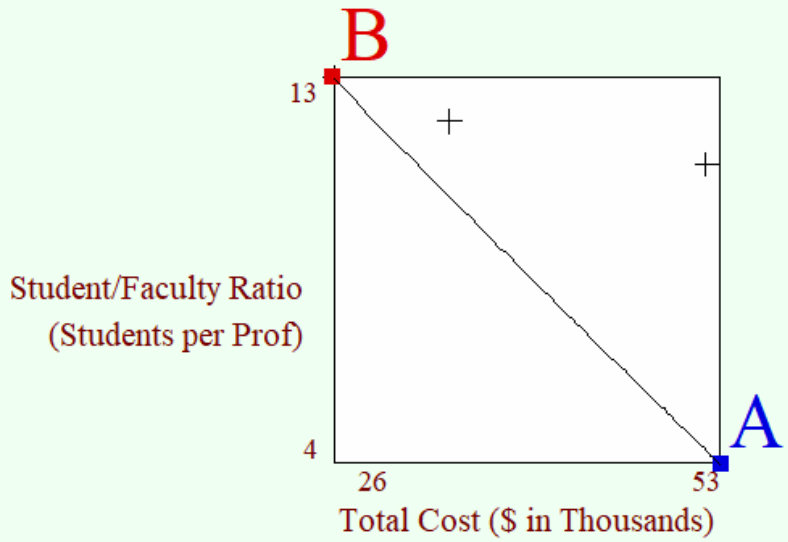
Weight Elicitation

Rank Sum

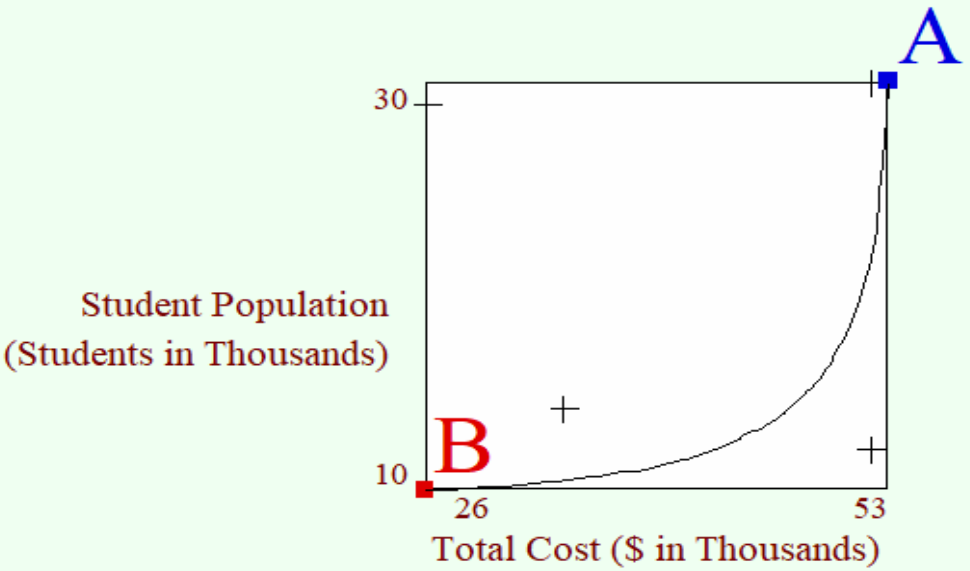
Measure	Measure Description	Rank	Wi = (n+1-Ri)/ sum(Ri)
1	Cost	1	0.25
2	Student/Fac. Ratio	2	0.21
3	R&D Budget	3	0.18
4	Size	4	0.14
5	Job placement rate	5	0.11
6	graduation rate	6	0.07
7	Research Space	7	0.04
Sum		28	1.00

Weight Elicitation

Tradeoffs



	A	B	A-B
Total Cost ($ in Thousands):	53	26	27
Student/Faculty Ratio (Students per Prof):	4	13	-9



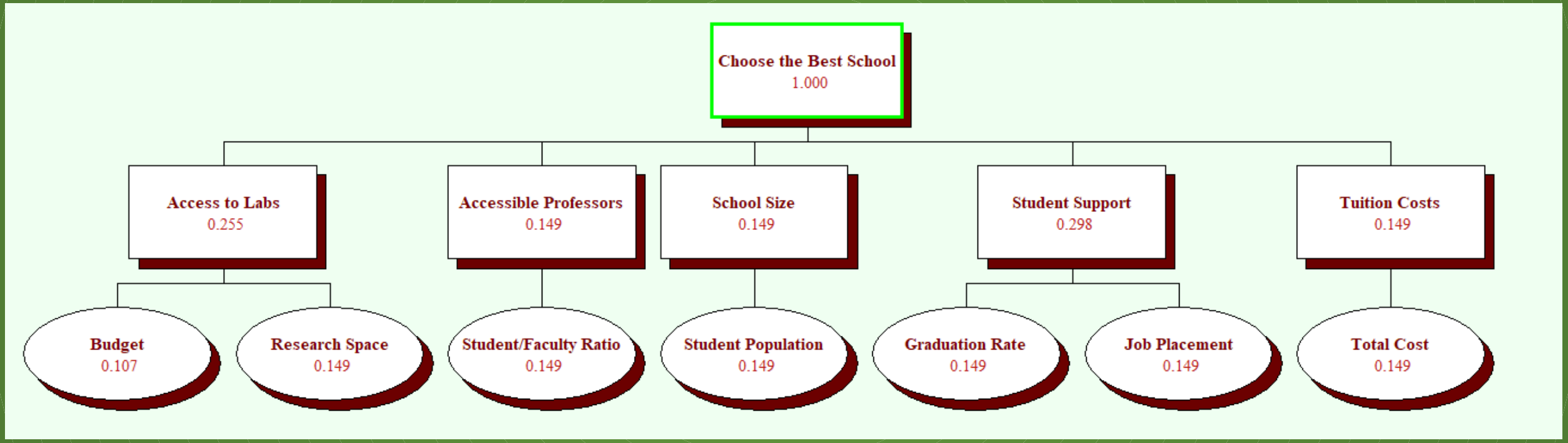
	A	B	A-B
Total Cost ($ in Thousands):	53	26	27
Student Population (Students in Thousands):	30	10	20

Weighted Value Function - Utility Rankings

	Choose the Best School Goal	Student Support Goal	Access to Labs Goal	Graduation Rate Measure	Job Placement Measure	Accessible Professors Goal	Tuition Costs Goal	School Size Goal	Total Cost Measure	Research Space Measure	Student/Faculty Ratio Measure
Weight	1.000	0.298	0.255	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149
University of Michigan - Ann Arbor	1.215	0.931	0.847	0.924	0.937	3.738	0.105	1.000	0.105	0.738	3.738
Georgia Tech	0.711	0.922	0.860	0.893	0.950	0.023	0.916	0.516	0.916	0.996	0.023
Virginia Tech	0.688	0.876	0.490	0.791	0.962	0.000	1.030	0.994	1.030	0.620	0.000
Rochester Institute of Technology	0.219	0.504	0.002	0.084	0.924	0.054	0.105	0.303	0.105	0.000	0.054

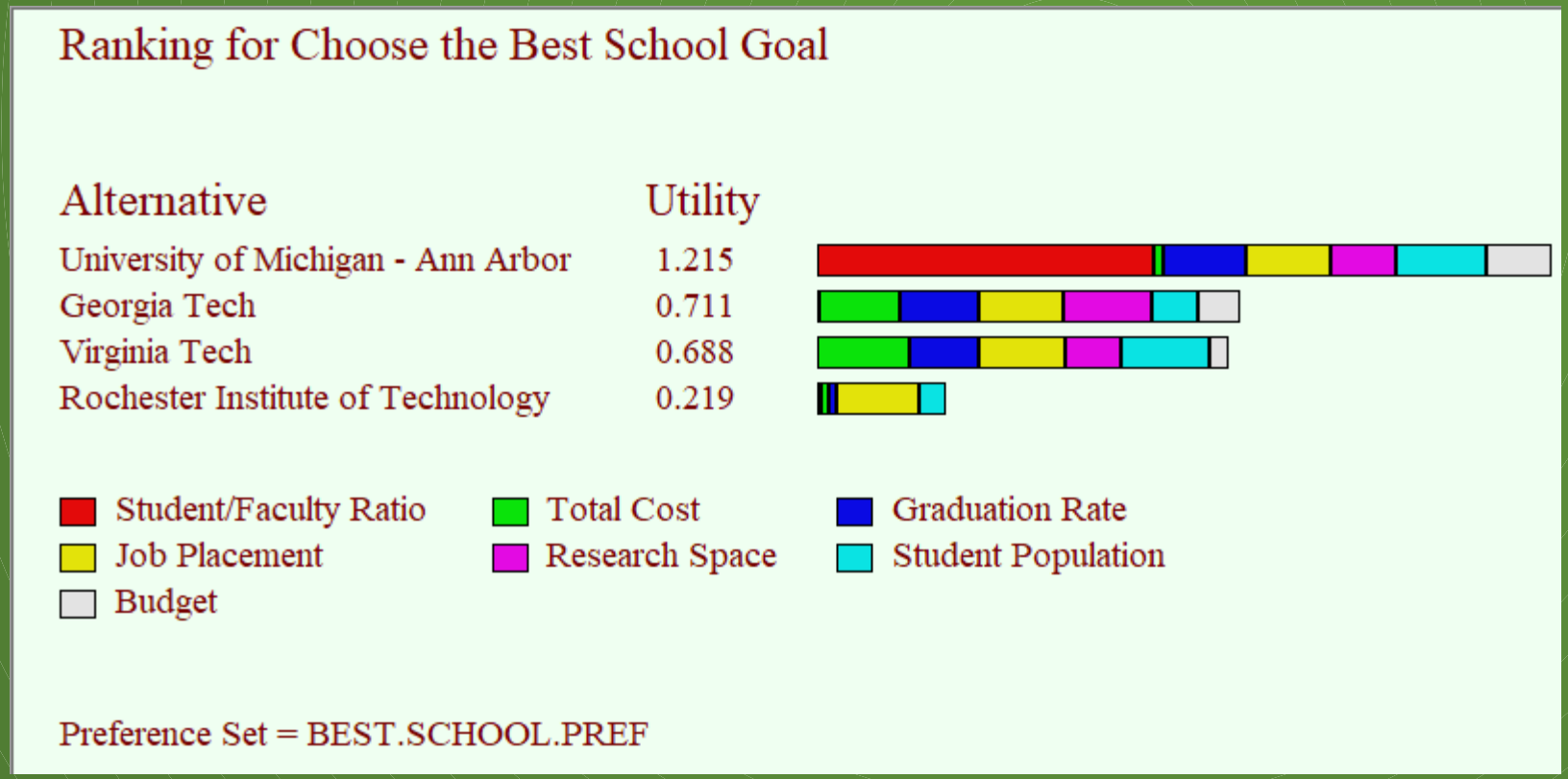
	Student Population Measure	Budget Measure
Weight	0.149	0.107
University of Michigan - Ann Arbor	1.000	1.000
Georgia Tech	0.516	0.669
Virginia Tech	0.994	0.309
Rochester Institute of Technology	0.303	0.004

Weighted Value Function - Utility Rankings



Conclusion and recommendations

In spite of the higher cost, the University of Michigan – Ann Arbor offers the most significant value, especially in regards to student/faculty ratio.



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Data Sources

We got the measure data from the websites listed below:

NCSES NSF Data
School ranking data
Best college Data
Academic Insitution Profiles