Center for

Integrative Sustainability

Strategic RoadMap BUSINESS Plan

SOUTHERN UNIVERSITY AND AGRICULTURAL & MECHANICAL COLLEGE

Office of Research and Strategic Initiatives

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Purpose/Scope

The Business Plan detailed below follows the overarching "Strategic Roadmap for Southern University's Centers of Strength Initiative" and nests within it. It details the business case for the Center for Integrative Sustainability. The Center, like the other four Centers at Southern, will utilize a common design that will link academics, research (innovation), and business partnering. From an academic standpoint, the Center's primary function will be the development of interdisciplinary programs across colleges – degrees, certifications, and other forms of training that leverage Southern's infrastructure to meet emerging needs. It is important to note that the Center, while operating within an academic and non-profit construct, has the potential for significant regional economic benefit. Analyses of key elements of this design and the subsequent economic impact form the heart of this plan.

This document reflects a bounded analysis of three key topics pertinent to the launch of Southern University's Center for Integrative Sustainability. First, it provides a "Coursework Assessment" that evaluates the current offerings of the Center in light of the economic context of Louisiana. Second it conducts a competitive analysis to consider the alternatives that students may consider when making a decision regarding attending Southern and pursuing a degree within the Center. Finally, a high level financial projection is included to ascertain the economic benefit derived from the Center when its outcomes achieve their projected result.

While traditional business plans are much larger and provide additional insights, the topics covered represent the priority topics Southern requires at this current point in time. As the Center moves forward, additional analysis and evaluation will be required to maximize the benefits to the state of Louisiana.

Coursework Assessment

This Business Plans commences with a Coursework Assessment to impartially gauge the applicability of the programs of study offered within the Center for Integrative Sustainability. Knowing what strengths, gaps, and challenges face the Center is crucial to charting an effective way forward. To conduct this Coursework Assessment, a review of the Center's majors was performed in light of the anticipated 4 & 5 Star Jobs which align to those majors, as described below:

Step #1: Center's Majors mapped to Baton Rouge area 4 & 5 Star Jobs - The Louisiana Workforce Commission's "4 & 5 Star Jobs" present an impartial, official view of forecasted job opportunities ("Long Term Projections for All Occupations to 2024") for the broader state as well as specific regions within the state. This data set was filtered for as follows:

- 4 & 5 Star jobs (removal of all lower ranked jobs)
- 4 & 5 Star jobs which hire from candidates with the Center's degree offerings. To ascertain appropriate majors, US Department of Labor's Bureau of Labor Statistics, Occupational Outlook Handbook's "How to Become One" educational recommendations[i] provided primary majors that align with various occupations.
- The Baton Rouge area ("Regional Labor Market Area 2")
- Jobs whose "most significant source of education or training" equals a Bachelor's degree or higher (removal of all jobs requiring less than a Bachelor's degree)

The table below contains jobs which fit the criteria above and align to College of Engineering majors:

Stars	Occ. Code	Occupational Title	Dept of Labor, Bureau of Labor Statistics, Occupational Outlook Handbook Identified Majors	2014 Estimate	2024 Projected	10 Year Growth	Annual New Growth	Annual Replacement	Annual Total Openings
5	2601198	Construction Managers	Construction science/mgmt, architecture, engineering	1,530	1,520	-10	0	20	20
5	2608503	Architectural and Engineering Managers	Architecture or Engineering	410	470	60	10	10	20
5	17-2041	Chemical Engineers	Chemical engineering	1,330	1,550	220	20	40	60
5	17-2051	Civil Engineers	Civil Engineering or Civil Engineering technology	1,270	1,440	170	20	40	60
5	17-2071	Electrical Engineers	Electrical engineering, electronics engin. or EE tech	400	460	60	10	10	20
5	17-2072	Electronics Engineers, Except Computer	Electrical engineering, electronics engin. or EE tech	310	350	40	10	10	20
5	17-2081	Environmental Engineers	Environmental, Civil, Chemical or General Engineer	310	400	90	10	10	20
5	17-2111	Health/Safety Engineers, Except Mining Safety	Any engineering discipline or industrial hygine	260	280	20	0	10	10
5	17-2112	Industrial Engineers	Industrial eng. or any other engineering discipline	580	620	40	0	20	20
5	17-2141	Mechanical Engineers	Mechanical Engineering or Mech Eng. Technology	650	780	130	10	20	30
5	19-2041	Environmental Scientists and Specialists	Enviro. Science or Biology, Chem, Geoscienc, or Engin	390	470	80	10	10	20
4	Nov-21	Natural Sciences Managers	Any science discipline or engineering	130	140	10	0	0	0
4	17-1022	Surveyors	Surveying, civil engineering, forestry	270	280	10	0	10	10
4	19-2042	Geoscientists, Except Hydrologists and Geogr.	Physics, chemistry, biology, math, engineering, CS	130	150	20	0	0	0

The table below contains jobs related to College of Sciences disciplines (same filtering):

Stars	Occ. Code	Occupational Title	Dept of Labor, Bureau of Labor Statistics, Occupational Outlook Handbook Identified Major	2014 Estimate	2024 Projected	10 Year Growth	Annual New Growth	Annual Replacement	Annual Total Openings
5	19-2041	Environmental Scientists and Specialists	Enviro. Science or Biology, Chem, Geoscienc, or Engin.	390	470	80	10	10	20
4	11. - 9121	Natural Sciences Managers	Any science discipline or engineering	130	140	10	0	0	0
4	17-1022	Surveyors	Surveying, civil engineering, forestry	270	280	10	0	10	10
4	19-1031	Conservation Scientists	Forestry, ag science, rangement mgmt, enviro. Science	380	420	40	0	20	20
4	19-2042	Geoscientists, Except Hydrologists and (	Physics, chemistry, biology, math, engineering, CS	130	150	20	0	0	0

Step #2: Scoring System (means of scoring of majors based upon jobs) – With relevant majors mapped to specific job titles it becomes possible to assess the total number of roles available in the Baton Rouge areas for each Center for Integrative Sustainability major using the Louisiana Workforce Commission's forecast data. Many roles will draw from multiple majors, so to understand the scale of total jobs available for each major, the total number of jobs was replicated in each applicable major. Of note – this means that the following individual columns do not add up to the total number of jobs available for Southern's graduates. Instead, since candidates with differing majors may each be viable for a type of job. Totaling up all job opportunities then gives insight into how to evaluate majors against each other

for marketplace viability. The table below provides the total jobs available for the College of Engineering majors:

Stars	Occupational Title	Dept of Labor, Bureau of Labor Statistics, Occupational Outlook Handbook Identified Majors	Annual Total Openings	Civil Engineering	Mechanical Engineering	Electrical Engin. & EE Tech
5	Construction Managers	Construction science/mgmt, architecture, engineering	20	20	20	20
5	Architectural and Engineering Managers	Architecture or Engineering	20	20	20	20
5	Chemical Engineers	Chemical engineering	60	0	0	0
5	Civil Engineers	Civil Engineering or Civil Engineering technology	60	60	0	0
5	Electrical Engineers	Electrical engineering, electronics engin. or EE tech	20	0	0	20
5	Electronics Engineers, Except Computer	Electrical engineering, electronics engin. or EE tech	20	0	0	20
5	Environmental Engineers	Environmental, Civil, Chemical or General Engineer	20	20	0	0
5	Health/Safety Engineers, Except Mining Safety	Any engineering discipline or industrial hygine	10	10	10	10
5	Industrial Engineers	Industrial eng. or any other engineering discipline	20	20	20	20
5	Mechanical Engineers	Mechanical Engineering or Mech Eng. Technology	30	0	30	0
5	Environmental Scientists and Specialists	Enviro. Science or Biology, Chem, Geoscienc, or Engin.	20	20	20	20
4	Natural Sciences Managers	Any science discipline or engineering	0	0	0	0
4	Surveyors	Surveying, civil engineering, forestry	10	10	0	0
4	Geoscientists, Except Hydrologists and Geogr.	Physics, chemistry, biology, math, engineering, CS	0	0	0	0
		Total Possible Jobs		**180**	**120**	**130**

The table below provides the total jobs available for College of Sciences majors:

Stars	Occupational Title	Dept of Labor, Bureau of Labor Statistics, Occupational Outlook Handbook Identified Major	Annual Total Openings	Ag Sciences	Urban Forestry	Biology	Chemistry
5	Environmental Scientists and Specialists, Including Health	Enviro. Science or Biology, Chem, Geoscienc, or Engin.	20	0	0	20	0
4	Natural Sciences Managers	Any science discipline or engineering	0	0	0	0	0
4	Surveyors	Surveying, civil engineering, forestry	10	0	10	0	0
4	Conservation Scientists	Forestry, ag science, rangement mgmt, enviro. Science	20	20	20	0	0
4	Geoscientists, Except Hydrologists and Geographers	Physics, chemistry, biology, math, engineering, CS	0	0	0	0	0
		Total Possible Jobs	50	20	30	20	0

Key Summary Takeaways

- *Number of Different Job Types*: A total of 17 relevant types of 4 & 5 Star Jobs were identified: 12 for Engineering majors, while 5 were identified for College of Sciences majors.
- *Total Number of Jobs*: Annually, 360 individual jobs aligned to Center for Integrative Sustainability majors are projected to be available per year in the Baton Rouge area. 310 individual jobs aligned to Engineering majors are projected to be available per year in the Baton Rouge area, while 50 for College of Sciences majors.
- *Alignment of Jobs*: All of the 4 & 5 Star Jobs identified as aligning to both Engineering and College of Sciences majors are "highly aligned" – meaning that the role requires a Bachelor's degree specifically in a Engineering-related discipline.

Strengths

- Solid 4&5 Star job opportunities exist in Engineering disciplines, especially Civil, Electrical & Electronics engineering
- Most current forecasts rank Mechanical & Electrical Engineering degrees as being one of the top 10 most in demand majors for number of jobs.[ii]

Challenges/Issues

- There are *zero* forecasted 4&5 star jobs for Chemistry majors
- Ag Sciences, Urban Forestry and Biology majors also face limited job opportunities in the Baton Rouge area.
- Comparatively few majors for Integrative Sustainability graduates – for reference, Business School graduates are forecasted to have 610 jobs to choose from during the same time period (see Business Plan for Center for Social Entrepreneurship for additional details).

Opportunities

- Termination of some majors may prove to be the appropriate data and market-driven conclusion reached by Southern leadership. If deemed appropriate, the associated freeing up of funds would enable growth in other areas while simultaneously helping students secure more marketable skillsets.
- As a land-grant institution, with deep historical ties to agriculture and forestry, active pursuit of science-driven an/forestry firms, collaborative research and partnerships with industry holds the key to improving the job prospects

Competitive Analysis

Academia, to its credit, places a strong value on collaboration. For purposes of assessing the academic "market" and options that prospective students may choose, however, it is imperative to identify and understand the available alternatives. The following analysis seeks to provide insight into who Southern's key alternatives or "competitors" are, the characteristics they possess, and what insights Southern can draw from this understanding. The analysis assesses the competition from multiple perspectives, since customers employ a range of factors in making decisions. Of note – competition does not equate to antagonism – competitors often collaborate together to achieve mutually beneficial results.

1) **Who are Southern's Competitors?**

The first step in understanding the overall context in which Southern's Center for Integrative Sustainability operates is to define who the key competitors are. This analysis will attempt to answer the question from the following vantage points – competitors as defined by Southern's customer's recent behavior, competitors from a broader geographic perspective, competitors who have been previously identified, and HBCU competitors in the region. Given that the Center for Integrative Sustainability's "product" offerings are the majors offered, the analysis will examine which majors are offered by the various schools.

a) Current Customer Insights: Competitive markets are dynamic environments as evidenced by customer preferences changing over time. Understanding current customer decision-making, however, serves as a critical starting point in assessing the competitive landscape. Only when we know the current status can we understand the broader context and emerging trends. While Southern does not possess current customer insights in the form of student surveys or Admissions data indicating other schools that applicants are considering, securing this information for ongoing insights is highly recommended.

b) Competitive Landscape:
Beyond immediate customer data, an understanding of the broader "universe" of competitors is required. While technically any training program, in any location, may represent a competitor, most colleges operate in one or more "spheres" with like institutions. For Southern University's Center for Integrative Sustainability, this analysis will look at four different spheres – schools within Louisiana, previously identified "peer" institutions, other regional HBCU institutions, and non-traditional competition.

i. Louisiana Competitors: There are 65+ degree-granting institutions in Louisiana, but this analysis excludes community colleges, for profits, and smaller/non-competitive institutions.

The table below displays the College of Engineering related offerings from these institutions

				Bachelor's Degree								Graduate Degrees				
State	Identified Competitor Institution	Enrollment	Tuition	Engin.	Civil Engin.	Mech. Engin.	Elect Engin.	Comp. Engin	Enviro. Engin.	Chem. Engin	Aero Engin.	Engineering	Civil Engin.	Chem Engin	Elec Engin	Mech Engin.
LA	Louisiana State University (LSU)	31414	$ 10,758	Multiple	✓	✓	✓	✓	✓	Multiple		Multiple	Multiple	Multiple	Multiple	Multiple
LA	Grambling State University	4863	$ 7,371	✓												
LA	Louisiana Tech University (Ruston)	12694	$ 5,553	Multiple	✓	✓	Multiple			✓		Multiple				
LA	McNeese State University (Lake Charles)	7626	$ 7,474		✓	✓	✓			✓		✓				
LA	Nicholls State University (Thibodaux)	6267	$ 7,628													
LA	Northwestern State University (Nachitoches)	9819	$ 5,180	✓			✓									
LA	Southeastern Louisiana University (Hammond)	14499	$ 5,778													
LA	University of Louisiana at Lafayette	17519	$ 10,026		✓	✓	✓	✓		Multiple		Multiple				
LA	University of Louisiana at Monroe	9115	$ 8,282													
LA	University of New Orleans	8037	$ 7,150		✓	✓	✓		Multiple			Multiple	✓		✓	✓
LA	Tulane University	13581	$ 51,010	✓						✓		Multiple		Multiple		
LA	Centenary University (Shreveport)	630	$ 31,156													
LA	Cornerstone University (Lake Charles)	N/A	$ 1,950													
LA	Dillard University (New Orleans)	1261	$ 16,580													
LA	Louisiana College (Pineville)	1126	$ 13,800													
LA	Loyola University New Orleans	4330	$ 39,492													
LA	University of Holy Cross (New Orleans)	1250	$ 13,050													
LA	Our Lady of the Lake College	3173	$ 12,984													
LA	Xavier University of Louisiana	2359	$ 21,212		✓	✓	✓		✓							
LA	Southern University & A&M College	5438	$ 8,102		✓	✓	✓					✓				

The table below displays the College of Sciences related offerings from these institutions:

				Bachelor's Degrees								Graduate Degrees						
State	Identified Competitor Institution	Enrollment	Tuition	Ag Science	Animal Sci.	Forestry	Biology	Chemistry	Physics	Bioinform.	Enviro. Hea/SC	Ag	Bio	Chem	Forestry	Environ. Toxic	Bioinformatic	Enviro. Health
LA	Louisiana State University (LSU)	31414	$ 10,758	✓	✓	✓	Multiple	Multiple	✓			Multiple	Multiple	Multiple	Multiple			Multiple
LA	Grambling State University	4863	$ 7,371				✓	✓	✓									
LA	Louisiana Tech University (Ruston)	12694	$ 5,553	✓	✓	✓	✓	✓	✓	✓	✓		✓				✓	
LA	McNeese State University (Lake Charles)	7626	$ 7,474	✓	✓		✓	✓	✓			✓		✓				✓
LA	Nicholls State University (Thibodaux)	6267	$ 7,628				✓	✓					✓					
LA	Northwestern State University (Nachitoches)	9819	$ 5,180		✓		✓											
LA	Southeastern Louisiana University (Hammond)	14499	$ 5,778				✓	✓					✓					
LA	University of Louisiana at Lafayette	17519	$ 10,026				✓	✓	✓	✓	✓		Multiple					✓
LA	University of Louisiana at Monroe	9115	$ 8,282				✓											
LA	University of New Orleans	8037	$ 7,150				✓	✓	✓		✓		Multiple	Multiple				Multiple
LA	Tulane University	13581	$ 51,010				Multiple	Multiple	Multiple		Multiple		Multiple	Multiple		✓	Multiple	Multiple
LA	Centenary University (Shreveport)	630	$ 31,156				✓											
LA	Cornerstone University (Lake Charles)	N/A	$ 1,950															
LA	Dillard University (New Orleans)	1261	$ 16,580				✓	✓	✓									
LA	Louisiana College (Pineville)	1126	$ 13,800				✓											
LA	Loyola University New Orleans	4330	$ 39,492				Multiple	Multiple	✓		✓							
LA	University of Holy Cross (New Orleans)	1250	$ 13,050				✓											
LA	Our Lady of the Lake College	3173	$ 12,984				✓											
LA	Xavier University of Louisiana	2359	$ 21,212						✓									
LA	Southern University & A&M College	5438	$ 8,102	✓		✓	✓	✓					✓		Multiple	PhD		

<u>Takeaways</u>

- *Competition within Louisiana in Engineering is more concentrated than the College of Sciences majors.*
- *LSU, the University of Louisiana and Louisiana Tech, as well as private institutions Tulane and UNO, offer numerous Bachelors or Masters programs in both Engineering and the Sciences. Of these, state institutions LSU, University of Louisiana and Louisiana Tech are the only schools in Southern's price band. Given the significant range of majors offered, they operate as strong alternatives and likely draw prospective students away from Southern.*
- *While not as extensive as some universities, Southern's offerings in Engineering differentiate it from schools without engineering programs.*
- *Southern's presence in Forestry and Environmental Toxicology are only offered at two other institutions and may be effective niches. Assessment of student demand and ability to differentiate from LSU and Tulane are crucial to competitive success.*

ii. HBCU Competitors: One of Southern's distinctives is its status as an HBCU institution. In itself, however, this is not a differentiating advantage because there are over 100 HBCUs in the US. Understanding the landscape of offerings related to Integrative Sustainability at

similar HBCUs in the immediate neighboring geographic area (LA, MS, AL, TX and AR) provides insights for Southern.

The following table captures the College of Engineering-related offerings from these institutions:

				Bachelor's Degrees								Graduate Degrees				
State	Key Neighboring HBCU Competitor Insti.	Enrollmen	Tuition	Engin.	Civil Engin.	Mech. Engin.	Elect Engin.	Comp. Engin	Enviro. Engin.	Chem. Engin	Aero Engin.	Engineering	Civil Engin.	Chem Engin	Elec Engin	Mech Engin.
MS	Mississippi Valley State University	2210	$ 3,114													
LA	Xavier University (New Orleans)	2366	$ 21,212		✓	✓	✓		✓							
AL	Tuskegee University	2485	$ 19,210			✓	✓			✓	✓	Multiple		✓	✓	✓
AR	University of Arkansas at Pine Bluff	2545	$ 10,740													
MS	Alcorn State University	2911	$ 6,720									✓				
LA	Grambling State University (Grambling)	3583	$ 7,371	✓												
AL	Alabama A&M University	4496	$ 17,738		✓	Multiple	Multiple					✓				
AL	Miles College	4638	$ 10,632													
AL	Alabama State University	4764	$ 16,156		✓											
TX	Texas Southern University	6696	$ 13,740			✓	✓	✓								
TX	Prairie View A&M University	6923	$ 22,272		✓	✓	Multiple	Multiple		✓		✓			Multiple	
MS	Jackson State University	7475	$ 17,494		✓		Multiple	✓	✓			✓				
FL	Florida A&M University (Tallahassee)	8128	$ 26,403	✓	✓	✓	✓	✓	✓	Multiple		Multiple	Multiple	Multiple	Multiple	Multiple
LA	Southern University & A&M College (BR)	5438	$ 8,102		✓	✓	✓					✓				

The table below displays the College of Sciences-related offerings from these institutions:

				Bachelor's Degrees								Graduate Degrees						
State	Key Neighboring HBCU Competitor Insti.	Enroll.	Tuition	Ag Science	Animal Sci.	Forestry	Biology	Chemistry	Physics	Bioinform.	Enviro. Hea/SCI	Ag	Bio	Chem	Forestry	Environ. Toxic.	Bioinform	Enviro. Health
MS	Mississippi Valley State University	2210	$ 3,114				✓	✓		✓	✓						✓	✓
LA	Xavier University (New Orleans)	2366	$ 21,212						✓									
AL	**Tuskegee University**	2485	$ 19,210	Multiple	✓		✓	✓	✓			Multiple	Multiple	✓				✓
AR	**University of Arkansas at Pine Bluff**	2545	$ 10,740	Multiple			Multiple	✓	✓			Multiple						
MS	Alcorn State University	2911	$ 6,720	✓			✓	✓	✓			✓	✓				✓	
LA	Grambling State University (Grambling)	3583	$ 7,371				✓	✓	✓									
AL	**Alabama A&M University**	4496	$ 17,738	Multiple		✓	✓				✓	Multiple	Multiple		✓			
AL	Miles College	4638	$ 10,632				✓	✓			✓							
AL	Alabama State University	4764	$ 16,156				✓					Multiple						
TX	**Texas Southern University**	6696	$ 13,740				Multiple	✓	✓		✓		✓	✓		Multiple		
TX	Prairie View A&M University	6923	$ 22,272	✓			✓	✓	✓			Multiple	✓	✓				
MS	Jackson State University	7475	$ 17,494				✓	Multiple										
FL	**Florida A&M University (Tallahassee)**	8128	$ 26,403	✓	✓	✓	✓	✓	✓		✓							
LA	Southern University & A&M College (BR)	5438	$ 8,102	✓		✓	✓	✓					✓		Multiple	PhD		

<u>Takeaways:</u>

- *Having an existing engineering is a significant positive for Southern in today's increasing STEM-oriented economy, but other schools have more depth/breadth*
- *Key competitors for Southern in the engineering arena appear to be other land-grant type institutions – Florida A&M, Prairie View A&M, Jackson State, Alabama A&M, and Tuskegee University possess depth and breadth of engineering programs.*
- *Nearly all HBCUs reviewed possess depth and breadth of Sciences programs that equal or exceed Southern's offerings*
- *Minimal competition exists in the area of Forestry. Interpretation of this trend requires additional market research to ascertain the demand signal by employers and students for this area of study*
- *Other institutions offering agriculture related degrees possess a far greater range of undergraduate and graduate programs s – no unique competitive advantages identified*
- *Possible niches exist in Environmental Toxicology and Forestry, if market demand*

iii. Previously-Identified Peer Institutions – SUBR possesses a 2011 report identifying "Peer" institutions, based upon criteria including enrollment similarity, land grant status, HBCU status, and number of PhD programs. There is some overlap with previous portions of this competitive analysis, but the institutions are included here as presented in 2011 to provide further context and comparison.

The following table captures the College of Engineering-related offerings from these institutions:

				Bachelor's Degree								Graduate Degrees				
State	Identified Competitor Institution	Enrollm	Tuition	Engin.	Civil Engin.	Mech. Engin.	Elect Engin.	Comp. Engin	Enviro. Engin.	Chem. Engin	Aero Engin.	Engineering	Civil Engin.	Chem Engin	Elec Engin	Mech Engin.
TX	Prairie View A&M	6923	$ 23,278		✓	✓	Multiple	Multiple		✓		✓			Multiple	
TX	Texas Southern	6696	$ 13,740			✓	✓	✓								
LA	U of Louisiana-Monroe	9115	$ 8,282													
VA	Norfolk State University	6281	$ 16,920				Multiple								Multiple	
AL	Alabama A&M	4496	$ 17,738		✓	Multiple	Multiple					✓				
IN	Indiana State University	13565	$ 18,876	Multiple	✓	✓	✓	✓				✓				
TX	Texas A&M – Corpus Ch	12174	$ 18,258			Multiple	✓					✓				
VA	Virginia State University	5634	$ 19,002	✓		✓	✓	✓								
TN	Tennessee Tech	10492	$ 15,864	Multiple	✓	✓	✓	✓		✓			✓	✓	✓	✓
TX	Texas A&M - Kingsville	8300	$ 20,356	Multiple	✓	✓	✓		✓	✓		Multiple	✓	✓	✓	✓
LA	Southern University & A&M College	5438	$ 8,102		✓	✓	✓					✓				

The table below displays the College of Sciences-related offerings from these institutions:

				Bachelor's Degrees								Graduate Degrees						
State	Identified Competitor	Enroll.	Tuition	Ag Science	Animal Sci.	Forestry	Biology	Chemistry	Physics	Bioinform.	Enviro. Hea/SCI	Ag	Bio	Chem	Forestry	Environ. Toxic.	Bioinform	Enviro. Health
TX	Prairie View A&M	6,923	$ 23,278	✓			✓	✓	✓			Multiple	✓	✓				
TX	Texas Southern	6,696	$ 13,740				Multiple	✓	✓		✓		✓	✓		Multiple		
LA	U of Louisiana-Monroe	9,115	$ 8,282				✓											
VA	Norfolk State University	6,281	$ 16,920				✓	✓	✓									
AL	Alabama A&M	4,496	$ 17,738	Multiple		✓	✓				✓	Multiple	Multiple		✓			
IN	Indiana State University	13,565	$ 18,876				Multiple	✓	✓				Multiple					
TX	Texas A&M – Corpus Ch	12,174	$ 18,258				✓	✓			✓		Multiple					✓
VA	Virginia State University	5,634	$ 19,002	✓			✓	✓					✓					
TN	Tennessee Tech	10,492	$ 15,864	Multiple	Multiple		Multiple	Multiple	✓		✓		Multiple	Multiple			✓	
TX	Texas A&M - Kingsville	8,300	$ 20,356		Multiple		✓	✓				Multiple	Multiple	✓				
LA	Southern U & A&M College	5,438	$ 8,102	✓		✓	✓	✓					✓		Multiple	PhD		

Takeaways:

- Most of the previously identified takeaways (see Louisiana and Regional HBCU Competitors) apply to these institutions as well.

- For engineering, Southern's number of offerings are in the bottom quartile compared to these peer institutions. Prairie View A&M, Alabama A&M, Indiana State, Tennessee Tech and Texas A&M Kingsville possess more depth and breadth of offerings.

- Southern's menu of undergraduate bachelor's degrees in the Sciences do not possess as much breadth as do the offerings from Tennessee Tech, Texas A&M Kingsville, and Alabama A&M. Key competitors appear to be adding in multiple degree offerings in Biology, Environmental Sciences to adapt to changing market dynamics

- Southern's Toxicology and Forestry niches each possess only one identified direct competitor – Texas Southern for Toxicology and Alabama A&M for Forestry.

iv. Non-Traditional Competitors – while generally considering other traditional four-year colleges as Southern's primary competitors, several other options are available to learners seeking training:

Artificial Intelligence (AI): Artificial Intelligence offers great promise to help make our lives more efficient while simultaneously reducing and replacing a myriad of roles. According to a December 2016 report prepared by the Obama Administration, up to 47 percent of current jobs will be affected by AI.[iii] While many lower skilled roles (truck driver, etc.) will likely be directly affected, engineering roles are not exempt. One trade journal noted, "AI will render many of the simpler professional tasks redundant – potentially replacing entirely many of the tasks by which our younger engineers and other professional learn the details of our trade.[iv] To make future Southern graduates employable, engineering and other disciplines will need to ensure that curricula provide value-added training in an

AI-dominated marketplace. With "business as usual" AI represents a key threat to Southern and other degree granting institutions

Online education: For traditional "brick and mortar" colleges, online options represent both an opportunity and a competitive alternative. More than 28% of higher education students in the US now take at least one online course as part of their studies. That represents a growth trajectory that has continued for 13 straight years[v]. Online education does not have as great a presence in bachelor-level science and engineering type degrees – instead tending to focus on master's level programs.

2) **SWOT analysis**

The following analysis focuses on the strengths, weaknesses, opportunities and threats (SWOT) that Southern's Center for Integrative Sustainability faces:

Strengths	Weaknesses
Engineering, Forestry & Toxicology– foundations to build upon *People* – leadership, faculty, staff Location – positioning in BR *History/Track Record* – experience, reputation & institutional knowledge *Relative Price* – inexpensive option compared to many alternatives *HBCU* – differentiating advantage	*Lack of Depth & Breadth – numerous other institutions offer significantly more engineering & sciences degrees, resulting in decreased quality/quantity of STEM graduates* *Cost/Time Commitment* – significant barrier for many students *Organizational Inertia* – difficult to rapidly adjust to a dynamic market
Opportunities	**Threats**
Computer Engineering/robotics – market gap and increasing demand *Increased offerings/specialization Baton Rouge* – anticipated growth and potential for high demand *Partnerships* – Government contracting, industry, foreign schools *Economic Growth* – state-wide and national economic growth	*"Aging Degrees"* – competitors adding new economy degrees threatens to bypass Southern *Specialization* – Southern's "basic" degree offerings not meeting market requirements, disadvantaging grads *Direct Competitors* – LSU, U of L, Louisiana Tech, Alabama A&M, Tennessee Tech

3) Competitive Analysis Key Takeaways

a) Possessing engineering programs is a strength of Southern's and should be exploited to create competitive advantages in an evolving market environment

b) Evaluating whether additional Bachelor's majors as well as further market-driven Master's degrees may take SU's current strengths and enable creation of additional market niches

c) Southern should conduct a careful evaluation of existing majors in light of market demand to determine long-term viability. In particular, existing sciences degrees which do not create a differentiating advantage and have poor job outlooks (Chemistry) should be reviewed to determine whether enhancement, specialization, or termination is appropriate.

d) Numerous partnership opportunities exist for Southern which present important means of leveraging the creation of a Center for Integrative Sustainability for Southern's advantage:

i. Intelligence Community (IC) agencies: Federal contracting policies incentivize agencies and contractor firms to partner with HBCU institutions. Southern's engineering focus is a natural means of building strategic relationships with the National Reconnaissance Office, Defense Intelligence Agency, and other IC entities/contractors that have a high demand for engineering degree holders. A first step would be pursuing security clearances and experience for graduates as well as enhanced partnership agreements with Washington DC-area contracting firms. More strategically, working with the agencies themselves (and the State of Louisiana) around locating certain functions in the Baton Rouge area would further enhance Southern's positioning and the region's economy.

ii. LSU – head-to-head competition against LSU is ill-advised due to the disparity in resources. However, partnership opportunities to leverage LSU research, technologies and initiatives may benefit SU via enhanced prestige and access to funding sources.

iii. Foreign Partnerships – SU's proactive outreach to universities in China has the potential to help create a node in specific areas where firms partner with Southern and its overseas counterparts to leverage students/graduates to produce their products

iv. Sources of patents/technology – creating/enhancing relationships with National Laboratories, Science incubators (i.e. NSF, etc.), government research organizations (DARPA, etc.) and others will provide ideas and technologies that businesses can be built around

e) Pay close attention to market dynamics, in particular the shift away from college graduates for lower end engineering and scientific functions. This is both a risk and an opportunity for Southern. Armed with advance notice, if effective preparations are made, it will be better positioned than many schools to deal with a change in demand for entry level science and engineering graduates.

Financial Projections

Projecting the financial impact of any new entity is an inexact science. However, by clearly capturing the detailed costs and carefully/conservatively projecting the anticipated financial benefit, an overall measure of the impact can be obtained.

Center Cost Structure

The following items represent the identified costs associated with operating the Center:

Staffing: $350,000. For staffing, the Center will be very streamlined, relying upon minimal staffing focused on driving economic impact, as described below:

- Center Director – key leaders tasked with building partnerships across stakeholder groups both within and outside of Southern. Oversees engagement activities, research projects and grants and partnerships.
- Project/Engagement Manager – responsible for coordinating projects and facilitating events designed to drive economic growth through the Center's initiatives
- Research Associates – graduate student roles, performing assigned research into new opportunities, partnerships, supporting grant writing and center initiatives
- Administrative Assistant – office management, scheduling, coordination, administrative support to Center staff and participation in events/initiatives

Offices/Facilities: $0. The Center will leverage existing SUBR infrastructure, enabling a highly streamlined operational structure. For office facilities, the Center will be located on Southern's main campus and utilize currently underutilized space. These offices will enable close collaboration between faculty, staff, students and external stakeholders while keeping overhead costs low.

Marketing/Advertising/Outreach/Partnerships: $50,000. While various forms of free advertising (news releases, speaking engagements, etc.) are useful, achieving the needed return on investment involves active marketing and outreach initiatives. The forms these activities take will vary depending upon both opportunity and need, but may include sponsoring events, paying for high profile speakers/luminaries, marketing and financial participation in initiatives that raise the Center's profile.

Additional costs: $20,000. Office operations, travel and miscellaneous needs

Total Annual Operating Budget: **$420,000**

Regional Economic Benefit

An estimated forecast for the economic impact of the Center for Integrative Sustainability can be created by evaluating several key factors:

Baton Rouge's need for increased economic activity: Recent reports indicate that the Baton Rouge area has performed significantly below the US large metropolitan area average from 2010-2015[vi]. Gross Metropolitan Product (GMP) for the Baton Rouge market ranks in the bottom 20 (out of 100) with economic growth of only 3.2% over the five year period. Further, hiring by firms 0-5 years old shrank by 12.7% during the period, indicating weakness in entrepreneurial ventures. For most other metropolitan areas in the US, these years following the economic downturn of 2007-2008 saw significantly more growth. While there are positive indications of future growth in the region (see Louisiana Economic Development forecasts), the region lags its peers nationwide.

Factoring in Impact

The Center as an Economic Engine: Government research shows that within the STEM disciplines there are both areas of excess supply as well as excess demand – in short, not all STEM degrees will fare equally going forward. For instance prospects for electrical engineers are positive while chemistry graduates face an uncertain future.[vii] These findings are quantified in the number of jobs projected to be available for each major (see Coursework Assessment). The uneven nature of demand requires careful forecasting of the economic impact of the Center. Accordingly, economic benefit will be calculated based upon engineering-related impact, which has the highest probability of growth.

There is room for economic growth in the Baton Rouge area, so a minor increase in STEM-related jobs will having a significant multiplier impact on the area's employment and Gross Metropolitan Product. It has been estimated that each technology-driven job creates five additional jobs, and two of the five

jobs are professional (lawyers, doctors, etc.).[viii] For Baton Rouge in 2016, the area's GMP was $51.6 billion[ix]. Accordingly, for every 0.1% increase, the region will accrue an additional $51.6 million in GMP.

By creating the Center for Integrative Sustainability, SUBR will facilitate and enhance an environment in the Baton Rouge area that will enable enhance and attract STEM-focused ventures. These sorts of ventures have been shown to stimulate regional economic development[x]. Determining the amount of economic activity directly linked to the Center is an inexact science, but the following illustrates potential impact.

If Southern launches the Center and is successful in creating an environment that produces in-demand STEM graduates, new ventures and relocating firms can be drawn to the area, especially if working partnership with the Center for Social Entrepreneurship. We forecast that the Center can foster and facilitate creation of 25 additional engineering jobs per year (based upon increased output addressing market demands). According to the Department of Labor, civil, mechanical and electrical engineers earn an average salary of $83,000-94,000year[xi], which would translate to an average GMP of over $2,125,000 within five years. Based upon the 5x multiplier effect, and assuming a conservative average salary of $50,000 for each additional job generated via the multiplication effect (conservative given that 2 of 5 are anticipated to be professional roles), an annual boost to the Baton Rouge economy of $10,625,000 is forecast. Over the next five years, a total of 125 new engineering roles with combined GMP impact of $53 million would be an approximate increase of 0.1027% to the area's GMP by 2022.

A 0.1027% increase in the area's BMP translates to noteworthy financial impacts to the state. Total projected income tax revenue (based upon a net 3% tax rate) would be $1,590,000 by 2022. Further, these additional jobs would drive significant sales tax revenue associated with their participation in the local economy.

The Center's creation of an Economic Ecosystem: As part of the aforementioned BMP increase, it is anticipated that many additional four and five star jobs would be created. As these are in addition to the current Louisiana Economic Development forecasts, the region stands to secure additional gains due to the establishment of the Center.

The Center as a Focal Point for Federal Contracting: Federal contracting regulations incentivize contractor firms to partner with HBCU institutions. Southern has built a successful foundation in this arena and stands to secure additional university revenue by expanding this focus. The Center for Integrative Sustainability, in partnership with the Center for Social Entrepreneurship stands as a natural entry point for engaging STEM-focused federal contractors. In particular, engineering and sciences focused firms would be natural partners for Southern to pursue.

University Financial Sustainability

For Southern University, creation of the Center portends direct economic benefit associated with increased student enrollment and new outside investment. Conservative forecasting based upon market demand and successful initiatives in other universities leads to the following:

- Estimated Tuition Revenue from Increased Student Enrollment/Retention: **$250,000/year**
    - Current data[xii] indicates that the Civil, Mechanical, Electrical and Electronic Engineering student enrollment is at/near 524 FTEs. Solid market demand for engineering graduates coupled with enhanced opportunities generated by the Center's entrepreneurial ecosystem is

forecasted to result in the ability to support an additional 50 FTEs ($5,000/student revenue) within five years

- Estimated Gift Revenue from Increased Donor Development: **$500,000/year**
    - Advancement efforts centered on STEM cater to one of the market segments strong giving capacity, especially given the ability of key donors to gift appreciated stock – achieving the dual benefit of avoidance of capital gains taxes and a charitable contribution deduction. As the Baby Boomer generation retires and transitions its wealth, an estimated $40 trillion is set to change hands within the next few decades. Outreach for giving in support of the Center is conservatively estimated to achieve $500,000/ year if actively pursued
- Estimated Grant Revenue from Increased STEM proposals: **$1,000,000/year**
    - Data clearly shows lagging minority hiring in STEM[xiii] – thereby also presenting a powerful opportunity to engage with foundations around addressing the deficiency. Southern's leadership in this arena could achieve significant investment and operating revenue, but is modestly targeted at $1 million for planning purposes.
- Estimated Local Baton Rouge Increased Corporate Investment: **$500,000/year**
    - STEM-related strengths at Southern directly enhance the economic vitality of the Baton Rouge region which will bring direct benefit to existing local businesses. Active solicitation of local partnerships that involve financial investments is targeted at $500,000 per year for planning purposes.

Return on Academic Investment

Like weather forecasting, identifying the total return on any investment is an inexact science. However, as described above, numerous benefits are derived from establishment of the Center for Integrative Sustainability. The following table captures the previously identified costs and compares them to the identified benefits, presenting them in a "Return on Academic Investment" structure so decision-makers can readily see payoffs. It should be noted that sales tax benefits were not incorporated into this evaluation, which would only increase the return on investment calculation.

Investment			**Return**	
- Staffing	$350,000		- Estimated Income Tax Revenue	$1,590,000
- Marketing/Ad.	$50,000		- Tuition Revenue	$250,000
- Office/Support	$20,000		- Donor Revenue	$500,000
Total Investment	**$420,000**		- Grant Revenue	$1,000,000
			- Corporate Investment	$500,000
			Total Return	**$3,840,000**
Total Return on Academic Investment	**914.29%**			

The total Return on Academic Investment (Total Return/Total Investment) is calculated to be 914.29%. Stated differently, for every $1 the State of Louisiana invests in this Center, it is forecasted that over $9 will be returned to the State and University from various sources. Further, this analysis does not incorporate broader economic benefits associated with the initiative.

Bibliography

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[i] Source: United States Department of Labor, Bureau of Labor Statistics, Occupational Outlook Handbook: available at: https://www.bls.gov/ooh/

[ii] Source: Job Outlook 2016, National Association of Colleges and Employers (NACE), available at: https://www.naceweb.org/store/2016/job-outlook-2016/, free summary at: https://www.forbes.com/sites/karstenstrauss/2016/11/23/top-degrees-for-getting-hired-in-2017/#4a8d0411634a

[iii] Source: "Artificial Intelligence, Automation, and the Economy," Executive Office of the President, December 2016, available at: https://obamawhitehouse.archives.gov/sites/whitehouse.gov/files/documents/Artificial-Intelligence-Automation-Economy.PDF

[iv] Source: "How AI Will Reshape Civil Engineering, " AI Business, August 31, 2016, available at: http://aibusiness.org/how-ai-will-reshape-civil-engineering/

[v] Source: 2015 Online Report Card – Tracking Online Education in the United States, Babson Survey Research Group and the Online Learning Consortium, available at: https://onlinelearningconsortium.org/read/online-report-card-tracking-online-education-united-states-2015

[vi] Source: The Brookings Institute, Metropolitan Policy Program, "Metro Monitor," March 2017, available at: https://www.brookings.edu/wp-content/uploads/2017/02/metro-monitor_full_af2.pdf

[vii] Source: STEM crisis or STEM surplus? Yes and yes US Bureau of Labor Statistics, May 2015, available at: https://www.bls.gov/opub/mlr/2015/article/stem-crisis-or-stem-surplus-yes-and-yes.htm

[viii] Source: The New Geography of Jobs, Enrico Moretti, 2012

[ix] Source: Forbes' "Best Places For Business and Careers," 2016 Ranking, available at: https://www.forbes.com/places/la/baton-rouge/

[x] Source: Entrepreneurship and Start-ups in the Boston Region: Differentiating High-Growth Ventures from Micro-Ventures," Small Business Economics 21(2):145-52 February 2003, available at: https://www.researchgate.net/publication/5158176_Entrepreneurship_and_Start-Ups_in_the_Boston_Region_Factors_Differentiating_High-Growth_Ventures_from_Micro-Ventures

[xi] Source, Bureau of Labor Statistics, US Department of Labor, available at: https://www.bls.gov/ooh/architecture-and-engineering/civil-engineers.htm, https://www.bls.gov/ooh/architecture-and-engineering/electrical-and-electronics-engineers.htm, https://www.bls.gov/ooh/architecture-and-engineering/mechanical-engineers.htm

[xii] Source: Southern University College of Business data, available at: http://www.subr.edu/assets/IRA/CollegeofEngineeringComputerScience.pdf

[xiii] Source: https://googleblog.blogspot.com/2014/05/getting-to-work-on-diversity-at-google.html