Association of Public Land-Grant Universities

Commission on Innovation, Competitiveness, and Economic Prosperity

Designation Program Submission for South Dakota State University

May 12, 2014
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APLU CICEP Designation Submission

South Dakota State University

Section 1: Process Narrative.

1.1 Introduction

A team of campus leaders met Dec. 13, 2013, to discuss the Association of Public Land-Grant Universities’ (APLU) Commission on Innovation, Competitiveness, and Economic Prosperity Designation process and determined that South Dakota State University (SDSU) should engage in the evaluation process and submit an application for designation with APLU. The team, brought together by President David L. Chicoine, included Kevin Kephart, vice president for research; Robert Otterson, executive assistant to the president; Michael Lockrem, director of University Marketing and Communications; and William Aylor, director of the Technology Transfer Office. Initial discussion determined how the phrases “innovation” and “economic prosperity” were interpreted and how the team could use those definitions to gauge the university’s effectiveness in helping encourage and facilitate innovation and economic prosperity. Innovation for research institutions can have many definitions but was defined by the team as new thinking that creates value.

The team defined economic prosperity as “better-off”; well-being; and measured in some way such as average income per household or per capita. Improved prosperity is being better-off and experiencing enhanced well-being in terms of standard of living and quality of life. In economic development, both of these are needed to achieve prosperity.

These definitions are reflected in the process used by the university and the key outcomes that the team achieved. The team was dedicated to thinking about the assessment and engagement process as a way to think differently about the role of the university and find areas where value could be created, captured, and strengthened in order to improve the chance for innovation and economic prosperity for university employees, students, and stakeholders.
1.2 Process Experience

Initial team discussions revolved around the key focus areas for the team and how it could best initiate a process that could produce actionable results. The team’s first focus area was “raising institutional awareness,” allowing the process to engage the campus and determine the level of awareness and communication already present, give a voice to individuals on campus who wish to be involved in the university’s efforts in innovation and economic prosperity, and reach out to the university’s entrepreneurial sectors through targeted education and involvement in shaping future goals. A second key area of focus, “engaging key stakeholders,” was added to provide an opportunity for non-university perspectives and experiences to determine how the university is involved in innovation and economic prosperity for the community, allowing external stakeholders more engagement with the university, and helping shape future goals.

Assessment tools provided by the APLU were utilized to gather data in key areas of innovation and economic prosperity. The surveys were uploaded to QuestionPro without any wording changes Jan. 16, 2014. The surveys were sent to internal and external stakeholders from the Office of the President with an introductory message from the president for both external and internal groups. The team followed up with both groups on a weekly basis to thank those who did participate, encourage others to participate, and to update both groups on the upcoming schedule of events, including the workshop. The internal group responded with 32 completed surveys while the external group responded with 30 completed surveys. The team also scheduled working meetings with both internal and external groups to gather data and narrative points for the process and to capture success stories for educating both internal groups and external stakeholders and for possible submission for other recognition programs. External stakeholders were encouraged to attend as many of the meetings as possible, including the APLU Workshop.
1.3 The Economic Engagement Enterprise and Economic Engagement Planning

Economic engagement with the university can be defined as:

- participating in a meaningful way for the creation and retention of jobs;
- developing human capital;
- attracting and fostering organic growth of business entities that create wealth to investors; and
- meeting market demand and thus delivering growth and development that has a special dimension.

A workshop brought internal groups and external stakeholders together to discuss the role of the university in innovation and economic prosperity and to identify areas of improvement identified by the survey (Appendix I, II, and III). Stakeholders were asked to clarify university roles in innovation and economic prosperity, discuss accomplishments, record relevant dates and facts, and note areas for improvement. Meetings were largely attended by external stakeholders and engaged internal groups, making the workshop an effective venue for participants to discuss the university’s role and how it can improve.

As the groups worked together in the meetings and the workshop, it became clear the university played a major role in innovation and economic prosperity and that role became more focused around 2007. Between 2007 and 2008, the university started the first Technology
Transfer Office (TTO) in the state of South Dakota and was an early voice for establishing a venture capital group in the state to work with early-stage inventions. South Dakota Innovation Partners\textsuperscript{vi} (SDIP) started shortly thereafter. The community of Brookings\textsuperscript{xiii}, brought a vision creating high-paying, science- and technology-driven jobs and has partnered to give university-based startups every chance to succeed.

In FY2013, the university had total research expenditure of more than $63.8 million with $5.9 million coming from private (nonpublic grant) sources. The community of Brookings, SDIP, and the university are working together to leverage the research, relationships, and innovation at the university to create high-paying jobs, license technology, and create economic prosperity in the region. The increased industry engagement can be shown in the recent number of agreements (non-disclosure, material transfer, license, collaboration, etc.) between the university and industry. FY2003 yielded five agreements while FY2013 saw 203 executed agreements.

The groups discussed different ways in which the university can help innovate and provide economic prosperity, including workforce development, research, consulting, and intellectual property development.

Regarding workforce development the groups discussed how the university is engaged in creating new degree-granting programs based upon workforce needs. That industry input into the curriculum develops future leads regarding industry and university collaborations in research and innovation. Across campus, existing programs and new undergraduate and graduate degree conferring programs are working with industry to develop students ready for the job market.

New doctoral programs in civil and mechanical engineering and in agricultural and biosystems engineering grew out of an ongoing relationship between the Jerome J. Lohr College of Engineering and industry partners.

Similarly, SDSU’s Department of Visual Arts maintains relationships with major agencies in the cities of Sioux Falls, Omaha, Des Moines, Minneapolis and beyond, assuring graduates will have the preparation to meet their future employers’ needs.
Along those lines, the architecture studies program began in 2009 based on industry relations and needs. Four architecture firms provided startup funds and advise the program. These firms pushed for a degree to provide local talent for the design and building sector since many of the region’s licensed architects are nearing retirement. The program’s first graduates walked in spring 2014 commencement. A new Architecture, Math and Engineering building will open in fall 2015, providing the space needed for program accreditation. The Division of Design is now bringing together the design fields of landscape, architecture, interior design, architecture, and graphics design to better serve the industry.

Other programs have been created or changed in response to industry needs. An operations management degree has been added to support the advanced manufacturing sector and its growth. A new Ph.D. program in biochemistry, which was developed in collaboration with Sanford Health/Sanford Research and the Avera Health Research Institute, expands and brings focus to biochemistry workforce development and for targeted research in support of health care. The non-university firms contribute eight industry researchers to serve as adjunct faculty.

In 2008, a Ph.D. program was added in computational science and statistics. The financial service sector has granted fellowships to support students who will provide analytical support and become more analytically advanced human capital for the sector. The university’s partnership with Raven Industries has created new minors in precision agriculture and will start in fall 2014. In addition, the Department of Agricultural and Biosystems Engineering will launch a precision agriculture strategic reinvestment with four full-time employees and an advanced teaching lab scheduled for 2016.

Industry relations have also benefitted from, and other times driven, relationships with other institutions of higher learning in the state. The Brookings-based business Daktronics\textsuperscript{viii} has agreed to sponsor a faculty position in accounting to increase the accounting majors in the region and the state. The university has collaborated with Northern State University on this position. The university has also started a master’s degree with Dakota State University in the area of data sciences and decision analytics, specializing in the health care and financial services sectors. In 2013, a partnership with Dacotah Bank was formed to accelerate and support collaborations with Northern State University, primarily in the agribusiness and in the banking and financial services sectors with the goal of graduating more students with job-ready skills. The university is teaming
with the University of South Dakota to offer a master’s degree of public health in 2014 in response to demands from the health care sector. This degree will be an online professional degree for practicing professionals.

Also, every department within the College of Agriculture and Biological Sciences (ABS) has an industrial advisory board made up of local and regional representatives. The boards meet regularly with faculty and students to evaluate and define the attributes they will seek from future employees. For example, food science—including food safety—has been revitalizing and refreshing curricula to achieve certification by the Institute for Food Technology in response to regional growth in biomanufacturing. This growth includes milk product manufacturing, meat processing, ethanol fermentation, and other manufacturing.

Additionally, the university offers a wide range of internship opportunities so students graduate with the tools they’ll need to launch successful professional careers, and employers can have confidence that graduates will arrive with both the preparation and real-world experience that will allow them to excel.

University researchers are an invaluable member of local economic prosperity through consultation with local industry. Workshop attendees discussed how the university can become even more involved in this process and make consultation easier and clearer for university researchers.

Creating an atmosphere conducive for startup company success has been one of the university’s strengths. The university has partnered with SDIP to assist university employee-created companies and has worked with both the Brookings community and SDIP to help those companies survive the valley of death, continue to de-risk the technology, and make it more attractive to industry. While certain areas of research have strong industry ties that make technology developed at the university readily available for industry license or for a startup to thrive, the university, SDIP, and the
Brookings community have heavily invested in making it possible for a startup to succeed with or without established industry contacts. However, help must be given to academic departments that do not have effective industry connections to reach out to attract research collaboration, innovation, and the sharing of ideas and to allow industry to help shape research goals.

The university will continue to expand the capacity and ability to reach out to potential industry partners for collaboration. The vice president for research is planning to change the department title to the Division of Research and Economic Development in order to give industry a clearer entry point into the university.

Also, the TTO will continue to grow and work more on connections between industry and areas of campus without strong industrial ties. These goals are not only in the university’s strategic plan, but also specifically addressed in Section II.

1.4 Promotion and Communication

One of the workshops recommendations was to continue identifying possible external stakeholders and potential collaborative partners for the numerous departments across campus. Engaged sectors of the university need to determine additional stakeholders that are currently under-recognized and determine their needs in both a research and workforce capacity. As a whole, the university can do this but each department may have a different set of stakeholders and collaborators that will need an individualized plan. The Division of Research and Economic Development will work as a designated entity for outside groups to reach into the campus, but strategies must lead to greater engagement across the institution. Expanded engagement will build on the successes of SDSU Extension and Engineering Extension and work of those entities within the state and local communities.

1.5 Advancing University Economic Engagement Among Peers

The university was the first research institution in South Dakota to establish a Technology Transfer Office. The university has since led the establishment of other statewide TTO offices and pushed for best-in-class services through standard handling of intellectual property and evaluation processes throughout.
Since inception, the TTO has grown from the first year of having five invention disclosures in FY2008 to the following averages for FY2010-FY2013:

### Table 1: Relevant TTO Averages from FY2010-FY2013

<table>
<thead>
<tr>
<th>Invention Disclosures</th>
<th>Patents Filed</th>
<th>Total Agreements</th>
<th>Agreements w/startups</th>
<th>Royalties per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>13</td>
<td>178</td>
<td>3</td>
<td>$1,820,324.00</td>
</tr>
</tbody>
</table>

Additionally, the university TTO works with other state institutions that do not have a TTO to provide services. The university has signed memorandums of understanding (MOUs) with Dakota State University and Northern State University to help evaluate, protect, and commercialize intellectual property developed at those institutions.

SDIP has continued to grow with university support. SDIP currently licenses technology from other institutions across the nation and formed strategic partnerships worldwide. SDIP is able to provide researchers with the ability to become a chief scientific officer of a startup company while letting the university and SDIP provide coverage in business and legal areas. Furthermore, the engagement with the local community has provided these companies and others with the facilities and capacity to take ideas and inventions past the bench top, over the valley of death, and from proof of concept through pilot- and commercial-scale plants.
Section 2: Summary of Accomplishments.

This section addresses three areas of achievement in innovation and economic prosperity that have been ongoing efforts of the university and are representative of its impact on economic prosperity.

2.1 Entrepreneurial Growth and De-risking intellectual property

The encouragement of entrepreneurial activities has been a long-standing goal of the university and an actionable item at the university\textsuperscript{x,xi} and an impact of SDSU Extension\textsuperscript{xii,xiii,xiv}. In addition to working with researchers, employees, and the community, the university has been dedicating time and resources to fostering these activities for students as well. The university offers seven different business competitions for students\textsuperscript{xv} with more than $45,000 in funds available, in addition to specialized courses and lectures.\textsuperscript{xvi} In 2014, it established the state’s first Student App Contest and plans to open the contest next year to all South Dakota college students. Undergraduate students have ample opportunities for laboratory research\textsuperscript{xvii}, which can lead to publications, awards, and building resumes and connections for graduate school. These efforts are recognized at Undergraduate Research Day\textsuperscript{xviii}, in the Journal of Undergraduate Research\textsuperscript{xix}, the annual Student Poster Session at the state Capitol\textsuperscript{xx} and the South Dakota Board of Regents student research day.

While the university has been a leading force in the entrepreneurial growth of South Dakota, there has also been a goal to de-risk intellectual property developed at the university for startups and industry. Since the university and SDIP formalized a partnership in November, 2009, the two have licensed 21 university technologies through 16 license agreements from 10 different research labs. Since 2011, these technologies have formed the base and expansion of seven different startup companies in engineering, animal health, pharmaceuticals, human health, biofuels, and others across all disciplines. These companies currently employ more than 35 full-time employees, have 37 patents and pending patent applications, and more than 35 worldwide strategic partnerships. The researchers involved have been able to fund their work through SMALL Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) funding, venture funding, and other private contributions while collaborating with researchers and industry around the world. Company growth and expansion have occurred rapidly as the
companies have raised more than $26 million in private equity. These startups have more than doubled the state average of SBIR proposals per year and have been awarded more than $1.3 million in Phase I and II funding since 2011. Public or private grants have added approximately $5 million in that same timeframe. Prairie AquaTech, xxi which started as an invention disclosure in 2011, has raised $2 million in private and public funding and is on a $10 million capital project building a pilot plant with the help of the university, BEDC, and SD Soybean Processors xxii.

Community partnerships have further provided funds, laboratories, and equipment for these companies. The Research Park at SDSU xiii broke ground in 2007 as the first research park in South Dakota. Other facilities for startups include: Brookings BioSpace, xxiv two proof-of-concept labs xxv, and the Technology Center for Rural Enterprise xxvi.

The university has also been helping to de-risk technologies by providing access to proof of concept funding through the Small Business Administration xxvii and from the Sun Grant Initiative xxviii (more than $100,000). Funding from these projects have supported or directly led to five startup companies based upon university technologies. Future funds will continue to leverage available funding for proof of concept and encourage collaborations between researchers across disciplines.

2.2 Industry Collaboration and Recruitment

The university has been focused on building relationships and collaborations with relevant external partners. In 2007-09, the university averaged 63 agreements per year with intellectual property ramifications. These agreements range from non-disclosure agreements to licenses and collaboration agreements. Over the last two years, these agreements have grown to more than 200 executed per year. The university encourages departments and researchers to collaborate with industry at higher rates than ever before. Sponsored research and sponsored services are one way of measuring such partnerships and the university has seen an increase in these agreements from three in 2007 to more than 40 in 2013. Nonfederal sponsored funding increased from $7.5 million in 2007 to $30.6 million in 2013, a three-fold increase over the period.

Another aspect of industry involvement has been the active recruitment of partners to campus, the Research Park, or the Brookings community. In August 2013, Raven Industries,
South Dakota State University and the Research Park announced a partnership focused on research and development coupled with student experiential learning. The collaboration among the three entities will concentrate on precision agriculture and associated workforce development. This type of partnership enhances economic growth in the state and region by building on the university’s discovery science to drive commercialization and create new products, services and jobs. Raven currently has six student interns working in Brookings. A similar recruitment brought the engineering firm EleMech, Inc. to Brookings.xxix

According to a recent study published by Colorado State University agriculture economists, South Dakota ranks first as the most agribusiness-friendly state in the nation. The study reviewed and ranked states on everything from governmental regulations and services pertaining to agriculture inputs and meats and livestock products, to funding of the South Dakota Department of Agriculture and percentage of the population with degrees in agriculture, environment and sciences. In the case of Bel Brands USA, these factors played a role in opening its newest manufacturing plant in Brookings. The company stated access to local talent as well as research and development were key in choosing to build in South Dakota. The plant will provide approximately 275 South Dakotans with competitive salaries and benefits when fully staffed and producing 22 million pounds of its Mini Babybel cheese each year.

Recruitment and collaboration is an ongoing process. The university has continued to be active in the process of getting industry to campus to visit with researchers. An example is the 2014 Livestock Biotech Summitxxx to be held September in Sioux Falls. The university has partnered with the city of Brookings and SD BIO to hold a preconference tourxxxii of SDSU and the city. Individuals will tour the Animal Resource Wing, Animal Disease Research and Diagnostic Laboratory, and Davisco Dairy Plant at SDSU as well as drive through some other units including the Cow-Calf Teaching and Research Unit, Equine Teaching Facility, Ruminant Nutrition Center, Sheep Research Unit, and Swine Research Unit and Feed Mill. The day ends with a dinner in which university researchers will be in the audience to hear an industry-led panel on collaboration and commercialization and have a chance to interact with relevant stakeholders in their discipline.
2.3 Best-in-Class Services from the TTO

The ongoing efforts to create an entrepreneurial culture, de-risk intellectual property created at the university, recruit and collaborate with industry are supported by an increased awareness from the TTO to be responsive to industry and provide best-in-class services. The university has long been a leader in innovation and economic prosperity in the state of South Dakota and that leadership has been repeatedly shown in the protection and commercialization of intellectual property. University leaders were instrumental in rewriting the South Dakota Board of Regents Intellectual Property Policy, which governs all intellectual property in Regental institutions in South Dakota. The leadership has also led the TTO to provide best-in-class services which starts with the TTO, vice president for research, and Office of Research and Sponsored Programs providing more than 20 educational seminars each year. Over the last two years, the TTO has created easy-to-negotiate standard agreements for industry collaborations including non-disclosure (NDA) and material transfer (MTA) agreements, research collaboration, sponsored research, and sponsored service. The TTO has also placed these agreements and other frequently requested documents, such as the Invention Disclosure Form, on the TTO website for ease of use for all parties. In order to encourage current partners to continue to work with university researchers, the TTO has developed master agreements for facility use and sponsored service for selected partners and a standard test-only MTA for the ease of industrial partners that wish to test university plant varieties for potential future license or collaboration. Over the last year, the TTO has negotiated more master agreements than in the prior accumulated history of the TTO due to the increased response by industry partners. The TTO has also formalized previous relationships with Northern State University and Dakota State University to work together as a community in the practice of technology transfer, derive mutual insights on best practices, act in the best interests of the public, and create an intellectual property and economic development collaboration that is beneficial to all parties.

The TTO has also partnered with SDIP this year to establish a joint group of marketing analysts. These analysts are graduate students in scientific disciplines. They are jointly trained by SDIP and the TTO on areas ranging from marketing reviews to intellectual property reviews. They then are given invention disclosures from the TTO to analyze and provide opinions on all matters of marketing and commercialization in reports generated by the analysts. Additionally,
they work with the university startup companies and SDIP to perform background analysis and groundwork for communications with potential industry collaborators or partners. In the first year of the program, these analysts have evaluated more than 20 technologies, generated reports, participated in meetings with researchers and the TTO, and helped the TTO make informed decisions on patentability, market potential, and finding connections within the marketplace for university innovation.

**Table 2: Areas of Accomplishment**

<table>
<thead>
<tr>
<th>Area of Accomplishment</th>
<th>Programs or initiatives</th>
<th>Place or connections</th>
<th>Timeline</th>
<th>Resources</th>
<th>Indicator/Measure of Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrepreneurial Growth and de-risking intellectual property.</td>
<td>Activity 1.1—Encouragement of entrepreneurial activities.</td>
<td>Educational opportunities and workforce development. This accomplishment is community development and helps integrate science/technology students with business competitions/classes.</td>
<td>The activities have increased over the last 10 years and continue to increase in number and variety (Student App Contest started in 2014 with 6 teams).</td>
<td>Funds were needed for: advertising; holding competitions; and prizes. People were needed for committees and to be judges to make each competition successful.</td>
<td>Success is determined by each contest having multiple, well-researched applications with those numbers continuing to rise so that the Student App Contest has 25 teams by 2017.</td>
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<td>Activity 1.2—De-risking (SDIP Partnership).</td>
<td>Partnership with SDIP has involved talent development, tech transfer and commercialization activities, translational and applied research, community development and integrations across campus and development.</td>
<td>This has been built over years, starting in 2009 with the beginning of the partnership.</td>
<td>The involved parties are the TTO, researcher(s), SDIP employees, and supported by all facets at SDSU (President, VP for Research, and department heads).</td>
<td>Success has been determined by seven companies still surviving, more than 40 employees, SBIR awards, private capital invested, and a pilot plant built.</td>
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<td>Activity 1.3—De-risking (POC funding).</td>
<td>POC funding has helped translate and apply research.</td>
<td>These were short-term efforts at de-risking had many long-lasting effects.</td>
<td>TTO, researcher, VP for Research, President, researchers, and departments have all been involved.</td>
<td>Increase in agreements 3x in six years to more than 200/year while licenses increased 5x over the same time, nonfederal funding increasing to $10M.</td>
</tr>
<tr>
<td>Industry collaboration and recruitment.</td>
<td>Activity 2.1—Industry collaboration.</td>
<td>Translational research, applied activities, tech transfer, and commercialization.</td>
<td>This has been a long-lasting effort that has been pushed since the TTO was established in 2007.</td>
<td>TTO, researcher, VP for Research, President, researchers, and departments have all been involved.</td>
<td>Increase in agreements 3x in six years to more than 200/year while licenses increased 5x over the same time, nonfederal funding increasing to $10M.</td>
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<td><strong>Activity 2.2—Recruitment.</strong></td>
<td>Workforce, collaboration, and commercialization, community development.</td>
<td>Both recruitments took building long-standing relationships between industry and campus.</td>
<td>Raven involved the President, VP for Research, and engineering. Bel Brands USA relied on dairy science and the Brookings Economic Development Corporation.</td>
<td>These company established locations in Brookings and the increase in interactions with SDSU that follow measured success.</td>
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<td><strong>Activity 2.3—2014 Livestock Biotech Summit.</strong></td>
<td>Education, applied activity, and tech transfer.</td>
<td>This was a yearlong project that started in 2013.</td>
<td>TTO, VP for Research, SD BIO, SDSU Research Park at SDSU, and the Brookings Economic Development Corporation were all involved.</td>
<td>Success is measured by having the extra day in Brookings and will be further measured by how many companies tour SDSU facilities and talk to SDSU researchers.</td>
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<tr>
<td><strong>Best in Class TTO services.</strong></td>
<td>Technology Transfer, commercialization, and collaboration.</td>
<td>This is an ongoing process that started almost two years ago and agreements are constantly reviewed and updated to make implementation easier.</td>
<td>TTO and Office of Information Technology services at SDSU used industry feedback to implement new agreements and post those agreements on the TTO website.</td>
<td>Increased agreements, less time for implementation of agreements, and ease of use for SDSU researchers to find a relevant agreement and ask relevant questions to the TTO.</td>
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<tr>
<td><strong>Activity 3.2—Partnership with DSU and NSU for TTO services.</strong></td>
<td>Technology Transfer, commercialization, and collaboration.</td>
<td>Long-standing informal relationship that was formalized to increase participation between the research institutions.</td>
<td>Administration at all three of the research institutions and the TTO at SDSU.</td>
<td>Signing of the MOUs is the success, but it will lead to more collaboration between the three on TTO matters.</td>
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<tr>
<td><strong>Activity 3.3—Marketing Analysts.</strong></td>
<td>Technology Transfer, commercialization, and collaboration, education and workforce development across categories.</td>
<td>Program is relatively recent—starting in fall 2013.</td>
<td>SDIP and TTO funds to pay analysts and graduate students for analysis.</td>
<td>The professional review of more than 20 technologies and increased leads for marketing. This will hopefully lead to increases in industry contacts and more licenses from the TTO and Sponsored Service/Research Agreements for SDSU researchers.</td>
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Section 3: Growth/Improvement Plan

The results of the assessment process, including the pre-workshop meetings and the workshop, gave opportunities for university improvement that have been implemented into a growth/improvement plan that promotes the raising of institutional awareness and engaging key stakeholders.

3.1 Educational opportunities for faculty and students

A large gap between importance and performance was in the educational opportunities section of the internal assessment. The workshop provided an opportunity to determine what educational opportunities and programs for university researchers and external stakeholders would be of interest. The combination of the assessment results and the workshop allowed for the stakeholders to paint the picture of areas in economic development and prosperity where education would be helpful and work with all levels of administration within the university on planning some further educational opportunities.

Many educational opportunities were mentioned for future implementation during the workshop. One educational opportunity was for researchers interested in consultation and potential university conflict of interest policies and procedures. This education would include workshops for researchers and graduate students to review the policy and receive advice and information on how researchers can consult within South Dakota Board of Regents policy guidelines. These procedures are currently being refined and the finalized version will provide an opportunity to hold a workshop so researchers can learn about consultation and the new guidelines. Using university researchers for consultation is a valuable tool for industry and external stakeholder engagement.

A second area mentioned was for education on decision-making processes involved for filing patents, how technologies are marketed by the TTO, and what happens to the researchers’ rights to use the technology after a license is signed. The TTO talks could be an opportunity for interested parties to learn more about the process and learn more about the TTO. These talks could provide both an educational opportunity and the ability for the TTO to engage researchers. A measureable outcome would be increasing innovative disclosures to the TTO.
Another educational opportunity discussed at the workshop was education on entrepreneurial activities beyond starting a business to illustrate the entrepreneurial spirit on campus. The university can build upon current efforts and initiatives to talk about other types of activities that encourage the entrepreneurial spirit. Many individuals on campus engage in activities with an entrepreneurial spirit that may not necessarily be starting a company. Education about the entrepreneurial spirit is important for those who are not in a startup, but are using entrepreneurial activities to work with groups, large and small.

The TTO can also become a part of the new graduate student workshop held every August. This would allow for the TTO to start a dialog with incoming graduate students on invention, intellectual property, South Dakota Board of Regents policy, and encourage innovation on the university campus by new students who will be a part of the university community.

There are no barriers to the completion of this area of improvement other than time spent putting together educational materials, seminars, and/or workshops. Following up with the researchers who have requested these materials on their satisfaction and on future areas of concern are key to addressing this issue. Another way measure success will be the attendance and participation of university researchers. The main barriers to success will be getting the word to interested researchers and offering enough opportunities for all to attend, given conflicts in time and commitments.

3.2 **Point of contact for industry**

A key area of the workshop was the discussion of innovation on campus. The discussion revolved around the two mechanisms of innovation: push vs. pull. Historically, innovation on campus has been pushed. An example of pushing innovation would be having innovation led by the process of writing grants and other funding opportunities. Innovation and invention is formed around those grants and pushed to industry to see if these innovations can fit within an industry’s framework. Pull innovation would be to have industry work with university researchers to determine areas of industry concern and for the researchers to address those concerns. Researchers can then either have industry fund the research or draft grant proposals around industry-relevant types of research. Engaged stakeholders would then pull innovations and inventions from the university into industry.
A key to having more pull innovation would be researcher comfort and communication with industry as well as industry having easy contact and communication with the university. The following questions did score as high as other questions for both internal and external stakeholder assessment:

*The institution promotes openness, accessibility, and responsiveness by: designating one entity as a first point of contact for industry and economic development agencies.*

The university plans to address this issue by creating the Division of Research and Economic Development and informing external stakeholders and industry. The researchers and departments will be encouraged to seek out and continue to communicate with industry independently, but this division will give the university a formal starting point for researchers to find a portal out to industry and industry a portal into the university. A second aspect of encouraging pull innovation is a TTO expansion in marketing and industry connection. As part of the Division of Research and Economic Development, the TTO will be more active in planning events that connect researchers to industry, such as the 2014 Livestock Biotech Summit. This requires the TTO to work closely with departments to make proper industrial contacts and help start relevant conversations between university researchers and industrial researchers. Measureable outcomes include increased invention disclosure to the TTO, increased agreements with industry, and increased sponsored research and licensing as industry pulls the technology out of the university.

The university’s growing roster of research centers offer an excellent foundation for collaborative, entrepreneurial work that may not lead directly to startups but which still can contribute to marketable ideas and innovations. The Translational Cancer Research Center brings together the pharmacists developing new drug therapies and delivery system with the physicians and practitioners on the front lines delivering patient care. As the lead institution on the Biochemical Spatiotemporal NeTwork Resource Center, or BioSNTR, the university brings together the talents of scientists working with plants, animals, and humans from five universities and two health care institutions, bioinformatics experts and unique tools that allow them to explore the inner workings of the cells. The university’s participation in two new governor’s research centers focused on developing engineering materials will provide important links to industry in the region and across the nation. It will be important for Division of Research and
Economic Development and the TTO to remain engaged with these centers so that they can have the industry connection and participation needed in order to meet research center goals.

Successfully addressing this issue will be key in making it easier for industry to connect with the university. Publicizing the new division’s name change and increasing TTO activity will be the main issues to overcome. Success will be measured by the increase in industry agreements, licenses, collaborations, and by polling external stakeholders on the ease and satisfaction in university relationships. This task will need continual monitoring and updates and will not be completed and forgotten. The main barriers for success are the constant need to work successfully in getting the Division of Research and Economic Development name in the public, the need for increased support to provide the services needed by Division of Research and Economic Development and the TTO, and outreach to research centers to keep them engaged with the university and industry.

3.3 Optimizing the website and social media to engage stakeholders and students

The university website has been housed in the University Marketing and Communications office since fall 2013. Discussions regarding overall Web governance and management are ongoing.

Among the objectives of the talks is to identify ways to more broadly leverage existing UMC and university resources, which will better highlight university research, accomplishments, experts and stories across the website, social media and other internal and external outlets. The site can serve as a portal not only into the university but also into the Division of Research and Economic Development.

Key to that effort will be creation of an SDSU News Center web portal—a central information hub able to easily feed content to other areas of the website—for example, department, college or administrative pages. The SDSU News Center will integrate seamlessly with social media and email newsletters to allow for increased finding of information for external stakeholders. For example, the Division of Research and Economic Development and TTO pages could include video stories of faculty and students working in SDIP-launched startups, features of TTO student interns working with inventors doing invention disclosure screening, links to
community economic development websites, and connections into industry collaborators and their presence in the Research Park.

Building the SDSU News Center requires upgrades and changes to the existing website content management system (CMS) in order to deliver the necessary improvements—for example, a mobile-friendly design and a more user-friendly interface for the more than 200 Web editors on campus. UMC and Web team leadership are negotiating the terms and details of that implementation and other changes that will help bring sdstate.edu into line with peers and industry best practices, as part of the ongoing discussions regarding Web governance and management.

Focus should remain, both from a news and marketing perspective, on the efforts about access to undergraduate research opportunities being a positive differentiator for the university. It not only can help attract students, but also prepare them for graduate school and give them a competitive edge when applying to professional programs, graduate schools or entering the job market.
<table>
<thead>
<tr>
<th>Goal 1 — Educational opportunities for faculty and students.</th>
<th>Objective 1.1 — Workshops on consultation and conflict of interest.</th>
<th>A workshop during the rollout of the new policy and follow-up workshops as needed.</th>
<th>The workshop will coincide with the new policy rollout which is within the year.</th>
<th>The people should be those who wrote the new policy and it can be held on campus.</th>
<th>A well-attended workshop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1.2 — TTO workshop on marketing.</td>
<td>A workshop on the decision making process involved at the TTO.</td>
<td>The talks should start in the fall and can be taken department by department.</td>
<td>TTO director and invitations by different departments on campus.</td>
<td>Talking to various departments will be a success.</td>
<td></td>
</tr>
<tr>
<td>Objective 1.3 — Entrepreneurial spirit.</td>
<td>Adding in aspects besides company building to current programs and initiatives.</td>
<td>Can be rolled out in the fall during the current programs.</td>
<td>No new resources needed.</td>
<td>Attendance at entrepreneurial activities by none company building employees.</td>
<td></td>
</tr>
<tr>
<td>Objective 1.4 — TTO at new graduate student workshop.</td>
<td>Have the TTO give a presentation at the NGSW.</td>
<td>Summer 2014.</td>
<td>TTO director at the NGSW.</td>
<td>Giving the talk.</td>
<td></td>
</tr>
<tr>
<td>Goal 2 — Points of contact for industry.</td>
<td>Objective 2.1 — Point of contact for industry.</td>
<td>Creation of the Division of Research and Economic Development</td>
<td>Should be started in FY2015.</td>
<td>A push-through marketing approach, the website, and other media to get the word out to industry and external stakeholders.</td>
<td>Website hits and a general understanding by industry contacts and external stakeholders.</td>
</tr>
<tr>
<td>Objective 2.2 — TTO marketing and industry contact involvement.</td>
<td>Hiring a FTE on marketing and industry contacts.</td>
<td>FY2015</td>
<td>Compensation for new staff member, office space, tools for success (computer and travel money).</td>
<td>Hiring a FTE, increased disclosures, having relevant industry on campus or researchers going to industry.</td>
<td></td>
</tr>
<tr>
<td>Goal 3 — Optimizing the website and social media to engage stakeholders and students</td>
<td>Objective 3.1 — SDSU News Center.</td>
<td>Creating a central information hub able to easily feed content to other areas of the website.</td>
<td>2015-2016</td>
<td>Web content and staff to oversee.</td>
<td>An active SDSU News Center Portal.</td>
</tr>
<tr>
<td>Objective 3.2 — Marketing undergraduate research efforts.</td>
<td>Creating content and publicizing the created content.</td>
<td>2015</td>
<td>Staff to oversee the project.</td>
<td>Creating content and then getting that content to undergraduate students and prospective students.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix I

Workshop on Innovation and Economic Prosperity Universities Program
South Dakota State University
April 16, 2014
Lohr Building Room T3

PURPOSE

The workshop will discuss South Dakota State University’s role in economic development, based on responses to assessments developed by the Association of Public and Land-Grant Universities and its Commission on Innovation, Competitiveness and Economic Prosperity.

AGENDA

1. Welcome from President David L. Chicoine
2. Introduction and background (Will Aylor)
3. Discussion on expectations of the university in economic development
4. Discussion on the APLU’s areas of engagement
5. Discussion on gaps in results
6. Recommendations for university priorities in economic development
7. Open discussion
Appendix II

APLU CICEP Workshop
April 16, 2014

Topic 1
- What is the role of South Dakota State University in regional economic development?
- What are the university expectations for economic development and how do we meet those expectations?
- What is the university doing correctly and what needs improvement for regional economic development?

Topic 2
APLU 7 principles of economic engagement:
1. Engaging and asserting institutional leadership;
2. Creating a supportive culture;
3. Ensuring that university activities benefit the public;
4. Contributing to the development of an innovation economy;
5. Providing relevant educational opportunities and programs;
6. Promoting openness, accessibility, and responsiveness;
7. Communicating contributions, successes, and achievements that benefit the region.

Key Purposes for the self-study:
1. Raising institutional awareness;
2. Engaging key stakeholders.

Topic 3
Internal Results Discussion

Lowest Scores (Internal):
1. The institution promotes openness, accessibility, and responsiveness by: maintaining user-friendly portals and web sites to search for faculty and staff expertise and R&D facilities. (3.54)
2. The institution promotes openness, accessibility, and responsiveness by: designating one entity as a first point of contact for industry and economic development agencies. (4.04)
3. The institution provides relevant educational opportunities and programs by: creating a culture of entrepreneurship across the institution, including training and mentoring opportunities for students and faculty. (4.10)
4. The institution contributes to the development of an innovative economy by: connecting economic actors across organizational boundaries to facilitate collaborations that otherwise might not occur. (4.16)
5. The institution creates a supportive culture by: recognizing—through promotion and tenure and/or other reward systems and on par with other forms of scholarly work—faculty involvement in an array of economic development activities, community partnerships, and business assistance. (4.17)
6. The institution creates a supportive culture by: promoting linkages between faculty and regional companies seeking access to expertise, and working to simplify and accelerate connections. (4.19)

Largest gaps between importance and performance:
1. The institution promotes openness, accessibility, and responsiveness by: maintaining user-friendly portals and web sites to search for faculty and staff expertise and R&D facilities. (2.5)
2. The institution promotes openness, accessibility, and responsiveness by: designating one entity as a first point of contact for industry and economic development agencies. (1.53)
3. The institution contributes to the development of an innovation economy by: analyzing local and regional industry studies and data to inform decision-making regarding university research, education, and outreach/engagement efforts. (1.48)

External Results Discussion

Lowest Scores (External)

1. The institution promotes openness, accessibility, and responsiveness by: designating one entity as a first point of contact for industry and economic development agencies. (4.73)
2. The institution provides relevant educational opportunities and programs by: supporting alignment of traditional undergraduate curricula across disciplines with 21st century workplace skills development. (4.82)
3. The institution creates a supportive culture by: promoting problem solving for community or industry needs. (4.84)
4. The institution contributes to the development of an innovation economy by: enhancing small business development with supportive programs (i.e., seed funding, incubators, technical assistance, etc.). (4.85)

Largest gaps between importance and performance:

1. The institution provides relevant educational opportunities and programs by: supporting alignment of traditional undergraduate curricula across disciplines with 21st century workplace skills development. (1.76)
2. The institution promotes openness, accessibility, and responsiveness by: designating one entity as a first point of contact for industry and economic development agencies. (1.41)
3. The institution promotes openness, accessibility, and responsiveness by: developing structure and networks (e.g. advisory groups, forums) to facilitate interactions among key university personnel and the region’s major economic actors. (1.32)
Appendix III

APLU CICEP Workshop Results
April 16, 2014

The APLU workshop was held April 16, 2014, in the Lohr Building in Room T3. The participants broke into groups to facilitate the discussion of various topics and were welcomed by South Dakota State University President David L. Chicoine. Will Aylor then gave some background information on the program and how it aligns with current university goals in economic development and the university’s strategic plan, IMPACT 2018.

The groups were then given the first topic, which was a discussion of the university in economic development, including the role of South Dakota State University in regional economic development. What are the expectations, and what are some examples of areas of strength and areas for improvement in regional economic development?

Some of the roles of the university in economic development include developing workforce, research, consulting, knowledge and technology generation, and business recruitment. Other important aspects are the university engagement in the community, including the university itself as a job creator, the impact of student spending in the community, and the impact of ancillary jobs such as spousal employment for university employees. Expectations of the university include the development of intellectual property and the transfer of such property, the development of both basic and applied research programs, and the ability to help take university technology through the valley of death (when appropriate) to help facilitate new company formation or licensing. One important aspect of innovation is the ability to get an idea from the bench to the market and all the scaling steps along the pathway. There is a need to complement the push process of technology, which happens when grants push ideas through a laboratory with a pull process in which industry is pulling ideas out of the laboratory to fill market needs. This process needs researchers communicating with industry and the university should strive to make connections and find needs that research can be built around to solve.

Degrees and programs should be supplying workers to meet industry needs. Consultation by university researchers can serve local industry needs and improve the success of local industry. An engaged university should improve the quality of life in the community.

Another area of discussion is the interplay between consultation and South Dakota Board of Regents (SDBOR) policy on intellectual property and conflicts of interest and how they interplay. The idea of a training workshop on this topic was discussed. Also discussed was the desire to have a portal that allows for those in industry to be able to better find the expertise, equipment and facilities they may need so that those in the market can search for ways to solve problems using the university.

The second topic for group discussion was the seven APLU principles of economic engagement and the university’s role in each.

1. Engaging and asserting institutional leadership.

   a. The groups discussed how is the university pushing the state in economic development and pushing others with examples such as the university having the state’s first Technology Transfer Office (TTO) in 2008, which helped establish the need and execution for similar offices in the South Dakota School of Mines and the University of South Dakota. Another area of discussion was how can the university plan for the future, especially in the area of administrative changes either at the university or the SDBOR institutions. The institutionalization of the economic development processes and goals need to be captured as different administrations may have different goals, experiences, and desired outcomes. The university may have solid footing now,
but changes in leadership can cause changes in priorities. An example of university success is the student success model for student retention and programs geared to help the state, such as the rural nursing program.

2. **Creating a supportive culture.**

   a. The groups emphasized the need for stories and examples of success to show university and external stakeholders the value being created at the university and encourage future innovation. Another idea was to bring in an outside entity to review the economic study produced by the SDBOR in September 2010 as to how the university positively enhances the local, regional, 1-29, state, and national economies.

3. **Ensuring that University activities benefit the public.**

   Not discussed.

4. **Contributing to the development of an innovation economy.**

   Among the advances discussed was the creation of the TTO in 2008 and building the Research Park at South Dakota State University. Future projects include the bioscience initiative and the Ag Tech Center.

5. **Providing relevant educational opportunities and programs.**

   a. The groups pointed to the different level of programs from entry to Ph.D. and new programs that are tied to economic development with the example of precision agriculture and how industry is providing input in curriculum based on needs of the industry. The groups also noted that sponsored research is integrated with education and that more industry-relevant majors enable the departments to collaborate more efficiently and effectively with industry partners. Further importance is the informal public education provided by the university by SDSU Extension, Engineering Extension and EpSCoR and the great success of those programs/departments.

6. **Promoting openness, accessibility, and responsiveness;**

   a. One key point was the need for TOO education or workshops on the decision making on whether to file or not file the patent and marketing the technology. The groups also stressed the continuing need to get into the labs of active research faculty who are not disclosing to make personal relationships with them in an effort to alleviate concerns and make disclosure easy.

7. **Communicating contributions, successes, and achievements that benefit the region.**

   The university has to identify stakeholders and target audiences, which can be different depending on the university department. The next stop is developing a matrix (numeric/performance indicators) to show those stakeholders relevant results. The university also needs to get success stories out to those stakeholders to inform them and allow those individuals to carry the message forward. The university can measure success through increases in revenues, job creation, and others adopting our practices developed at the university. The adoption of practices may be industrywide or helping improve an aspect of a process for a single stakeholder, but when others adopt university practices it benefits both the adopting party and the university.

Next, each group worked on an area of the APLU survey that either received a low score or had a large gap between importance and performance to discuss how that area could be improved or the gap lessened.
Group 1:

The institution promotes openness, accessibility, and responsiveness by: maintaining user-friendly portals and websites to search for faculty and staff expertise and research and development facilities. (3.54)

The first step is to admit that this is the lowest score and that this problem must be addressed and fixed. Ideas for solutions include decision trees that could be created to fix the technology problem. A human component must also be addressed as people and companies are getting lost knowing whom to contact. There needs to be one central source for businesses to find people and resources. Data mine the hits and searches on the website so that the university can respond to areas of significant searching and needs. External groups cannot use our website easily as they don’t know the colleges and departments. A formal head to deal with external groups and be the key central person for contact would help to fix the problems. The university should also be looking into getting the word out about our resources and people and may want to explore how to use social media to address these problems.

Group 2:

The institution promotes openness, accessibility, and responsiveness by: designating one entity as a first point of contact for industry and economic development agencies.

One solution offered by the group is the renaming of the Office of Vice President of Research to include economic development such as the Division of Research and Economic Development. This gives external groups a more clear idea of where to connect. The renaming would need to be publicized. It is also critically important that faculty members know that they can and should be a first point of contact with relevant industry, but they can also inform the vice president of the newly named division when they need to move forward with such contacts into an agreement such as sponsored research, collaboration, or a non-disclosure agreement. Online, web, and social media presences are needed so that a company can search and find relevant information about university personnel, facilities and equipment. SDSU Extension can be a great first point of contact. A topic for future consideration is the establishment of a research foundation.

Group 3:

The institution provides relevant educational opportunities and programs by creating a culture of entrepreneurship across the institution, including training and mentoring opportunities for students and faculty.

The first area the group discussed is what are the respondents’ thoughts on entrepreneurship and the spirit versus actually creating businesses. The group pointed out that being entrepreneurial is not only found in business formation, but also in many of the activities university personnel undertake daily. This score could be a communication issue and the education on this topic could provide value. Also, student business competitions are plentiful and provide students the opportunity to learn the basics of business planning and starting a business while potentially being rewarded for that work. The group also discussed whether faculty incentives might not be high enough especially for non-tenured faculty. The group further discussed whether cross-discipline programs would help to encourage students from all walks of campus to take advantage of available entrepreneurial programs.

The workshop provided many ideas for ways to address university involvement in economic development, innovation, and prosperity. Some of these were:

1. Conflict of interest workshops for researchers and graduate students;

2. Seminars or talks by the TTO on the decision-making processes involved at the TTO for filing patents, how technologies are marketed, and what happens after a license is signed to a researchers rights to use the technology;
3. Education on entrepreneurial activities that go beyond starting a business to show the entrepreneurial spirit on campus for those that aren’t in a startup using Entrepreneur In Residence-type activities to work with small and large groups and try to communicate to those on the fence on these types of activities;

4. Creating the Division of Research and Economic Development and informing external stakeholders and industry about this part of the university;

5. Further discussion on how to enhance the university website and utilize social media to help push external groups to the personnel and facilities they may need;

6. TTO expansion in marketing and industry connecting while working closely with researchers to further encourage disclosure;

7. Increased publication of undergraduate research opportunities to increase interest, bring in desired students, and help those students learn and be able to enhance their portfolio for graduate school or employment.
South Dakota State University is teaming with the Association of Public and Land-Grant Universities (APLU) and its Commission on Innovation, Competitiveness, and Economic Prosperity for an assessment of the university’s impact on regional economic development. The process includes an external assessment designed to solicit feedback from stakeholders on the university's role in regional innovation, economic development and prosperity. This tool can help leaders better understand the role of SDSU in local and regional innovation and economic development while giving guidance to better align SDSU policies and practices to make the most effective contributions to regional innovation and economic growth.

Our key areas of focus within the APLU structure are “Raising Institutional Awareness” and “Engaging Key Stakeholders.” Raising Institutional Awareness will help us think through the facets of engagement and the implications for SDSU. Engaging Key Stakeholders will provide an opportunity for people with different perspectives and experiences to come together to explore regional economic engagement issues.

The key questions to think about within these categories are:

- What does SDSU do well?
- And, what needs to be improved upon?

You have been chosen to participate in the external assessment which consists of the survey that follows. After the survey closes and the results are compiled, we will schedule an open forum to discuss the results of this and a concurrent internal assessment. Hopefully these assessments and the forum will give us a clear view of how SDSU is viewed in regional economic development, and we can use this information to highlight successes, address shortcomings, and make future plans.

South Dakota State University is teaming with the Association of Public and Land-grant Universities (APLU) and its Commission on Innovation, Competitiveness, and Economic Prosperity for an assessment of SDSU’s impact on regional economic development. Part of this process is an internal assessment tool to enhance regional innovation and prosperity. This tool can help us evaluate SDSU's engagement in economic development. Our key areas of focus are “Raising Institutional Awareness” and “Engaging Key Stakeholders.” Raising Institutional Awareness will help us think through the facets of engagement and the implications for SDSU. Engaging Key Stakeholders will provide an opportunity for people with different perspectives and experiences to come together to explore regional economic engagement issues. The key issues to think about within these categories are what do we do well and what do we need to improve upon. You have been chosen to participate in the SDSU Internal Assessment which consists of the survey that follows. After the survey closes we will have an open forum to discuss results and thoughts from SDSU faculty, staff, and students. We will also be performing an External Assessment survey with our various stakeholders to get their views and then having an open forum with them to discuss their results. Hopefully this will give us a clear view of how SDSU is viewed in regional economic development both internally and externally and we can use this information to highlight successes, address shortcomings, and make future plans. Thank you for your help and we look forward to seeing you at either or both of the forums when they are scheduled.
First Dakota National Bank Student Ventures Program ($30,000); Brookings Economic Development Corporation Idea Competition ($1,500); Governor’s Giant Vision Student Competition (over $12,500); Business Launch Boot Camp & Accelerator ($1,000); Innovation Expo Conference/Student Idea Competition ($1,000); First Dakota National Bank Business Plan Competition ($8,000); and the SDSU Student App Contest ($5,000)

In 2014, two Proof-of-Concept labs have also been opened at the Research Park, which offers wet lab and office facility. The Ron Reed Revolving Lab at the Innovation Center is designed for proof-of-concept and pilot scale development milestones for engineering-based startup companies and the Ron Reed Revolving Lab helps startups in the bioscience field validate emerging technologies. The labs provide users with more than $300,000 in equipment for use within the facilities.