Georgia – SDSU: Degree Accreditation and Institutional Support Initiative for Science, Technology, Engineering, and Mathematics (Georgia 2020)
Final Proposal

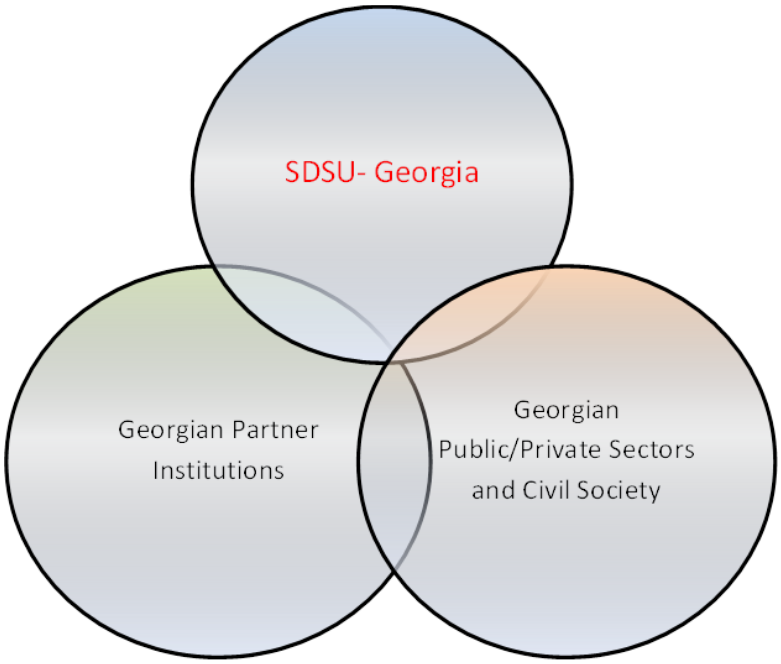
Submitted to

MCC Georgia

February 13, 2014

by

San Diego State University
5500 Campanile Drive, MC 1933
San Diego, California, 92182
Attn: Nancy Marlin, Provost



SAN DIEGO STATE UNIVERSITY

Provost
5500 Campanile Drive
San Diego CA 92182 · 8010
Tel: 619 · 594 · 6881
Fax: 619 · 594 · 0178

February 13, 2014

Nodar Surguladze, Tertiary Education Project Director
Ketevan Tateshvili, Procurement Officer
Millennium Challenge Account-Georgia
8 Rustaveli Avenue, Block B
Tbilisi 0114, Georgia

Dear Nodar and Ketevan,

On behalf of San Diego State University, I am extremely pleased to submit our Final Proposal for Capacity Building and Establishing Bachelor Degree Programs in STEM Higher Education in Georgia.

The outcomes for the Republic of Georgia proposal remain the same as those of our Interim Proposal: capacity-building in critical engineering and science programs, achieving ABET accreditation, expanding the representation of women and socially vulnerable populations, and stimulating economic development of the Georgian STEM-related economy. What has changed between our Interim and Final Proposals is a deeper understanding and refinement of how to best achieve these outcomes. We have incorporated the feedback received from the Technical Evaluation Panel and modified the proposal to address each of the Panel's concerns. Additionally, we have worked even more closely with faculty and administrators from our partner institutions, especially during their recent visit to San Diego State University on January 27-29, and included many of their valuable insights and recommendations.

All of these revisions have resulted in an extremely exciting Final Proposal that we look forward to presenting to you in Tbilisi on February 19.

Cordially,

Nancy A. Marlin, Ph.D.
Provost and Senior Vice President

Table of Contents

1 Final Proposal Review Criteria – Summary

1. *Reasonableness of the proposed approach for delivering at least three proposed Finalist and Georgian Partner Institution Bachelor degree programs that meet requirements outlined in Task 1, clearly explaining the rationale behind Partner and degree program selection and responsiveness to industry demand for graduates in corresponding fields.*

   Georgia 2020 will begin offering degree programs in Engineering and Applied Sciences in Compact Year 2, including Electrical Engineering, Computer Engineering, Chemistry with a Biochemistry Emphasis, and Computer Science). These programs correspond to accredited degree programs at the Finalist Institution, SDSU. The fundamental approach is to assist the Georgian Partner Institutions in adopting the existing accredited curricula from SDSU, and these degrees have been selected to meet the requirements of the program, the documented needs and demand from the Georgian partner institutions, and evaluations of the ABET review team readiness report. Partner institution faculty will be trained in delivery of approved course material, implementation of appropriate evaluation strategies, and supported with modern facilities that address existing gaps in the pathway to ABET accreditation. Compact Year 1 will be used to fully operationalize the program and ensure that students are identified and prepared to matriculate into the degree programs, especially socially vulnerable students.

2. *Quality and appropriateness of proposed curricula content (e.g. adaptation of home campus curricula to the Georgian context) and delivery method (e.g. balance of Finalist faculty-led courses in Georgia vs. Georgian faculty-led and/or technology-mediated courses).*

   Compact Year 1 will be used to intensively evaluate existing partner institution curricula, especially courses that could be potentially accepted by the accrediting bodies as General Education courses. In addition, Georgia 2020 will implement an intensive multi-pronged approach to train and qualify partner institution instructors to deliver mid- and upper-division courses through in-person faculty experiences both at SDSU and the partner institution. The balance of faculty responsibilities will be weighted toward SDSU initially, but will be transitioned to complete Georgian control in a stepwise manner that includes team teaching as those faculty gain experience in delivering and evaluating accredited degree programs.

3. *Achievability of reaching maximum level of student enrollment in proposed programs by Compact Year 7.*

   In recognition of this challenge, the entire first compact year is dedicated to establishing, marketing, and enrolling students into the program. In close collaboration with the partner institutions, Georgia 2020 has a clear plan to establish itself as a desirable selection under the Government of Georgia state institution enrollment program. Degree offerings have been selected based upon documented needs and demand from the Georgian partner institutions.

4. *Staffing pattern of proposed faculty and staff (quality and quantity), including key staff from both Finalist and Georgian Partner Institution, consistent with the educational quality needed for Finalist and Georgian Partner Institution degrees.*

   Experienced SDSU faculty will teach and oversee the programs taught in Georgia. Georgian faculty will be selected by our partner universities for their interest in adapting their pedagogy, course content and laboratory assignments to align with U.S. accreditation standards. These

faculty will receive training at SDSU prior to participating in the program. The staffing pattern, as proposed and described more fully in the budget justification, is entirely driven by the number of students (enrollment), preferred class sizes (faculty ratio), and class delivery modality (on-line vs. in-person). This plan will ensure instructional quality and management consistency.

5. *Appropriate facilities and equipment needs for proposed programs: An adequate assessment of current facilities/equipment has been conducted at Georgian Partner Institutions; An adequate explanation of program facilities/equipment needs and a supporting budget has been provided; An adequate assessment and budget to ensure compliance with MCC environmental guidelines has been provided; Budget is realistic and includes adequate contingency.*

   Georgia 2020 has specifically engaged Saunders Group Ltd., a Georgian-based construction engineering and design firm to validate and confirm, with appropriate site visits, that the proposed facility modifications are feasible, and have been adequately budgeted. In addition, a construction contingency fund of 10% of construction costs and equipment contingency of 10% has been set-aside to address potential cost overruns, unforeseen financial market impacts, tariffs or other contingencies. Professional engineering feasibility assessments and estimates are included as documentation.

6. *Proposed approach leads to long-term, sustained improvements in capacity of Georgian Partner institution program faculty and staff, including adequate support to future ABET accreditation of Georgian Partner Institution programs.*

   Partner institutions will be the recipients of additional sufficient facilities that will aid in the provision of the existing ABET accredited curriculum transferred from SDSU to the partner institutions. In addition, Georgia 2020 will provide assistance and resources for periodic progress reviews during the Compact. Finally, after Compact Year 7, resources for faculty, consultants and other required staff to *secure* and maintain ABET accreditation has been allocated for the long-term operational sustainability of the program. Based upon need and opportunity, additional degree programs and new facilities will be developed as a phased approach and will be introduced as the initial programs transition to partner institution degrees. This expansion will be funded by industry investment, self-support operations, and tuition reserves.

7. *Proposed approach encourages the enrollment and retention of women, minorities, low-income students, and other disadvantaged populations in STEM bachelor programs.*

   Georgia 2020 will use a multi-pronged approach to reach and prepare disadvantaged and underrepresented populations for success in the program. SDSU has a long and successful history of enrolling under-represented students, and those best practices will be implemented including: Early identification (Junior-year in High School) of interested disadvantaged students; Provision of preparatory English and STEM training to improve competitiveness; Georgian National Examination preparatory training; Needs-based scholarships. Approaches and metrics for success will be based on SDSU's successful Compact for Success and other programs that support underrepresented students such as the National Institutes of Health (NIH) funded IMSD and MARC Programs. These approaches will be appropriately applied in the Georgian context by the partner institutions.

8. *Context-appropriate student learning and support programs, including: Innovative bridging and/or remedial programs to improve the preparedness of degree students; Innovative proposals for programs that support student learning, including faculty advising, library/ICT resources, research opportunities and career development; Proposed approach for supporting student life and extra-curricular activities.*

   Georgia 2020 has prepared the partner institutions to support elements of student life and learning equivalent to high-quality programs in the United States. Additional facilities including smart classrooms, meeting rooms, and conference rooms have been budgeted, long-term research associations contemplated and facilitated, and where possible, existing Georgian partner institution programs for peer-to-peer mentorship strengthened and leveraged. To ensure equal access and success in the anticipated English-only instruction degrees, English preparatory opportunities will be supported – at zero student cost – prior to the national examination date, supporting the access and efforts of not only English-prepared students, but also students from all backgrounds provided they have interest. The English preparation courses also serve as an excellent recruitment mechanism for the program. Providing this program to students at no cost will be especially important for economically disadvantaged students. The English preparatory curriculum includes opportunities for students at all levels of language ability to engage and quickly demonstrate the proficiency required for entrance. Courses prepared and offered range from introductory Developmental Writing to Advanced English for International Students. Student life activities will include a learning community approach in which students in the SDSU-Approaches and additional activities are detailed in section 19, responsive to Task 13. As part of these activities, we look forward to the very special commencement ceremony SDSU will hold in Tbilisi.

9. *Strength of partnership between Finalist and Georgian Partner Institutions: Demonstrated coordination and commitment among partners, including a draft agreement between Georgian Partner Institutions on proposed programs; Agreement on budget allocation among partners and direct financial and/or in-kind contributions/co-financing from partner(s); Clarity and strength of proposed management/administrative structure.*

   Agreement has been reached during an intensive visit by representatives from the partner institutions to SDSU from January 27-29, 2014. During these working sessions, collaborative ties were strengthened among identified institutional leaders. Resource allocation was confirmed and improved to establish relevant technical laboratories across the three partner institutions, outfitting appropriate digital media, computer laboratories and teaching assets at all three partner institutions, and establishing a methodology for preserving partner institution budget allocation from the Government of Georgia while simultaneously supporting the costs of the new program development and delivery.

10. *Affordable cost of attendance, including: Context-appropriate planned tuition rates for Finalist and Georgian Partner Institution degree programs; Context-appropriate financial aid packages, with innovative proposals to increase enrollment of women, ethnic minority and low-income students.*

    Tuition has been set to ensure the long-term sustainability of this innovative program. At-cost enrollment fees have been preserved for all partner institutions based on existing per-student compensation. Substantial funds from the proposed tuition have been set aside to support both

merit-based and *needs*-based scholarships. The budget ensures that the demonstrated financial need of many students will be met, while preserving a tuition structure that allows for high-quality education and facilities development required for accreditation.

11. *Appropriate use of investment resources including $29 million Compact Funds, GoG contribution, GRDF, Finalist, and private sector contributions; include specific proposals to a) ensure long-term effect of the use of these resources, and b) for co-financing and in-kind contributions.*

    Use of the investment funds is detailed in the budget and budget justification. In particular, strict adherence to good accounting practices was implemented to ensure that one-time investment funds have been used for one-time development or facilities, and on-going costs have been matched to long-term operational revenue from tuition. The balance of investment vs. operating revenues is critical for the continued sustainment and growth of the program.

12. *Adequate and sustainable business model (operational costs and revenues) to independently maintain program quality by Compact Year 7.*

    Compact Year 7 budget represents a single moment in time that captures projected steady-state revenue from tuition. As noted in the Interim Proposal Technical Evaluation, the business model proposed establishes a provisional "reserve" of unobligated funds by Compact Year 7. These funds, as described in detail later, will be leveraged to support the continued success of the program through four principal uses:(1) Establishment and development of new degree programs using the successful Georgia 2020 development model – disciplines to be determined in collaboration with partner institutions based on capacity and demand; (2) Construction of new facilities to allow for program expansion; (3) Maintenance and repair of existing equipment and supplies required to maintain the currency of course offerings; (4) Improving student scholarship aid to ensure long-term access for socially-disadvantaged student groups.

13. *Long-term vision and sustainability plan demonstrates a commitment to implementation of quality bachelor degree programs in Georgia for at least 20 years.*

    The economic impact of the robust science and engineering industrial sectors in Southern California provides a clear example of the long-term benefits of investing in higher education. For example, the San Diego region has more than 430 biotech companies and it has the largest cluster of biotech startups in the U.S. SDSU faculty and students have developed a number of these biotech companies, and SDSU has trained the STEM workforce required for the many knowledge-based jobs in this industry. We are confident that we will help build a qualified workforce in Georgia that we can attract biotech companies to build facilities in Georgia. Thus, SDSU offers a unique perspective for the role of STEM education in enhancing economic growth and development, and provides a model for the development of high-paying, white-collar career opportunities for Georgian citizens that will enhance the economy of the Republic of Georgia for 20 years and beyond.

2 Response to the comments of the Technical Evaluation Panel

1. *Reduce the number of programs and focus efforts. Align programs with partner capacity. Detail curriculum definition, clarify the relationship between the curricula and ABET accreditation.*

The number of programs has been reduced from 6 to 4. This will allow more focus on building these programs during CY1. Purchase of some equipment has been moved to later years to allow for greater focus on the start-up needs. Additional details have been provided regarding SDSU's curriculum and accreditation.

2. *Provide details regarding the training of Georgian Faculty and the capability to provide courses over a 12-hour time difference.*

   Details have been provided regarding Georgian Faculty training. In summary, training programs will range from 6 weeks to a semester. Training programs similar to those for current and new SDSU faculty offered by our Center for Teaching and Learning will be provided with professional development and teaching strategies at the core. We reference our capacity to coordinate with our existing Georgian collaborators. To address the 12-hour time difference, we will offer synchronous courses as morning courses at SDSU, so they will be available as evening courses in Georgia (or evening courses at SDSU and morning courses in Georgia) – a timeframe that is common at our partner institutions. Many of our online courses can be offered asynchronously to best accommodate the student's schedule or time zone differences.

3. *Detail remedial (bridging) education. Support aggressive enrollment targets.*

   Three preparatory institutes are detailed (English language, STEM, and National Examination). A full portfolio approach to enrollment is detailed, including on-ramp capacity to accept students that may already be enrolled in their first year of university education.

4. *Bolster administration. Explain faculty hiring plan.*

   The central administration and partner institution campus administration have been increased with staff positions and responsibilities described in detail. A spectrum of faculty development and hiring strategies are described. Additional funding has been provided to partner institutions to pursue their own faculty hiring and recruitment strategies.

5. *Negotiate space with partner institutions.*

   Tbilisi based company, Saunders Group Ltd. was retained to provide a comprehensive Independent Inspection Report including site visits with identification of the specific spaces to be renovated and dedicated to Georgia 2020. Relationships will be cemented via contractual obligations (sub-contracts, leases, etc.).

6. *Detail renovation costs. Support equipment upgrades.*

   Saunders Group Ltd. provided a comprehensive Independent Inspection Report and Cost Estimate. This report is referenced and provided as back-up documentation. Equipment costs have been updated. A 10% contingency has been preserved on renovations, construction, and equipment costs. In addition, extensive equipment upgrades have specifically been budgeted in Compact Year 7.

7. *Document partner contributions. Document partner institution needs and commitments.*

   SDSU can document a direct contribution of $4,798,832 in foregone, approved and administration costs. In addition, SDSU will provide support for students from San Diego to study abroad in Georgia and competitive resources for faculty travel to Georgia for collaborative

research projects. The partner institutions were hosted at SDSU from January 27-29, 2014 and their needs and commitments are integrated throughout the final proposal.

8. *Document compliance of rehabilitation with MCC Environmental Guidelines.*

   Saunders Group Ltd. was retained to provide a comprehensive Independent Inspection Report and Cost Estimate. This report directly references and documents compliance with local and international standards and MCC and IFC guidelines for all proposed rehabilitation and new construction.

9. *Detail use of Compact Funds.*

   Additional detail has been provided. A detailed budget justification for all expenditures has been added.

10. *Justify tuition.*

    Following extensive discussion, advice from our partner universities, and analysis of several budget models, we have been successful in implementing the panel's recommendations that tuition be reduced and scholarships enhanced. A full spectrum of recruitment strategies is detailed.

11. *Demonstrate Post-Compact capacity.*

    A detailed and sustainable long-term business model is presented with sufficient contingency and new program development funds available. Participation by local industry is documented through new MOU's and advisory board commitments Communities have come to recognize the importance of "anchor institutions" to the economic health of their region. Public and private entities committed to their locations, anchor institutions have dramatic impacts on cities and regions, influencing their identity, culture, and economy. Recognizing the ties between our own success and that of our region, SDSU has embraced its role as an anchor institution and assumed greater responsibility for economic and community development. Georgia 2020 will assume similar responsibilities for the Republic of Georgia.

3 Introduction

To reflect both the target date for this program to reach steady-state productivity and our aspirational goal, with 20/20 being the metric of perfect eyesight, San Diego State University's program is titled Georgia 2020.

The mission of Georgia 2020 is to provide US-style higher education focused on the needs of the Republic of Georgia in science, technology, engineering, and mathematics (STEM), and other relevant disciplines. The program will build upon the expertise of San Diego State University to provide a sustainable STEM higher education program in Georgia for at least 20 years.

Georgia has recognized a critical shortage of qualified STEM professionals graduating from current institutions of higher education. The medium and long-term objectives of this program are to remedy this shortage by (1) providing qualitative and quantifiable improvement of human capital in the Georgian STEM labor workforce, including the recruitment, education and training of traditionally under-represented student groups, (2) developing a robust STEM workforce to supply high quality technicians and professionals for companies operating in Georgia, (3) enhancing economic growth in

Georgia, (4) increasing employment in companies requiring market-driven technical skills, (5) establishing appropriate private-public-academic sector relationships to ensure long-term sustainability of the program. These objectives will be achieved by offering Bachelor of Science degrees in STEM disciplines, building the capacity of Georgian universities in key STEM disciplines, facilitating the ABET accreditation of partner universities in Georgia, and building partnerships with industry in Georgia and internationally.

San Diego State University (SDSU) is the lead partner in the development of the program, including delivery of curricula, faculty development, supervision of instruction, installation and management of modern instruments, laboratories, and implementation of the program. SDSU will collaborate closely with partner universities in Georgia to develop high quality, sustainable degree programs. SDSU will confer bachelors of science degrees to graduates of these programs. Our partner universities in Georgia may also confer degrees that are consistent with their curriculum and graduation requirements.

Why SDSU? SDSU's long and successful experience working closely with industry has contributed to San Diego becoming one of the major hubs of biotechnology, pharmaceutical, and cyber-technology industries in the world. For example, San Diego now has the second largest cluster of biotech companies in the U.S. and the fastest growing biotech sector in the U.S. SDSU has trained the largest proportion of the qualified STEM workforce for local industries (including Qualcomm, Cymer, Pfizer, Merk, Eli Lilly, Novartis, Glaxo Smith Kline, Bayer, and many others). Biotech, hi-tech, and cyber-tech industries are key drivers of the local economy, resulting in an average income in the San Diego region that is 9% greater than the U.S. overall. In addition, this industry sector provides an employment growth that outpaces the rest of California, both during periods when the economy is doing well and during periods when the economy has been challenged. The science and technology industry in the San Diego region is expected to add over 125,000 jobs to the local economy over the next two years[1].

Education has been the catalyst of this robust science and technology industry. SDSU provides the educated workforce required for these industries. We regularly interact with industry to evaluate needs and opportunities that will ensure SDSU students receive the type of state-of-the-art training required for the local industry, thereby providing graduates that are competitive for the best jobs and also ensuring that the graduates optimally serve the local industry. This collaboration has led to several new degree programs that provide graduates with skills needed by industry and have had economic benefits to industry.

The economic impact of the robust science and engineering industrial sectors in Southern California provides a clear example of the long-term benefits of investing in higher education. Thus, SDSU offers a unique perspective for the role of STEM education in enhancing economic growth and development, and provides a model for the development of high-paying, white-collar career opportunities for Georgian citizens that will enhance the economy of the Republic of Georgia.

San Diego State University is especially well positioned for Georgia 2020 as this project is a natural extension of SDSU's experience with and institutional commitment to internationalization. Beyond a highly international curriculum, SDSU provides students with international experiences to better educate them for the increasingly interconnected world in which they will be living and working. SDSU is one of the top ranked universities in the U.S. for the number of students studying abroad (Open Doors survey, Institute for International Education, 2013) and has been named a "Top Producer" of student

[1] http://www.biocom.org/?m=sp_view_doc&file=Shared%20Documents/Images/Home%20page/BIOCOM_EconomicImpactReport.pdf

Fulbright Awards[2]. A goal of Georgia 2020 will be for students from SDSU to take courses with their Georgian colleagues in Tbilisi, thereby enabling Georgian and U.S students to collaborate on design and other high quality STEM projects to further stimulate international collaboration and development. In addition, Georgia 2020 will provide many opportunities for mutually beneficial faculty collaborations.

Student Life. In addition to academic experiences, we will develop activities that promote student engagement, development, and success. In parallel with student life at SDSU, these activities will include: student clubs focused on particular disciplines and career opportunities; student invited speakers who will discuss different careers, new advances in sciences and engineering, issues related to STEM ethics and policy, and other areas of student interest; field trips to local industries, environmentally relevant sites, and arts and culture events; peer-to-peer tutoring opportunities that help students with learning and teaching skills; meetings with Georgia 2020 faculty members to discuss a wide range of topics related to science and higher education; and other functions to promote student interactions outside of the classroom. There are considerable data indicating the impact of such academically-related student life activities in the retention and success of students in demanding fields like the proposed STEM curriculum. In addition, these activities offer networking opportunities that enable employers to see the high quality of the program and students, which will enhance industry-university connections and lead to increased access to high quality careers after graduation. Based upon the Georgia 2020: Creating opportunities for inclusive growth report from MCA Georgia, it is clear that such opportunities are currently very rare.

In addition to these academically related student engagement opportunities, we plan to implement other programs that build a sense of culture among the students participating in the joint program. For example, SDSU basketball games are extremely popular with our students, providing both a social outlet and instilling a sense of pride in the university. We could stream the games to a lecture room in Georgia to bring together faculty and students to share the excitement with colleagues in San Diego. The timing of many of these games would allow real-time video streaming. Likewise, we often have special lectures by prominent authors, business people, and others who are an inspiration for students, and we could stream these lectures to Georgia as well. These lecturers can be provided by real-time streaming, allowing students from Georgia to ask questions from a distance, or can be provided asynchronously to allow students to participate at a more convenient time with a facilitator from the faculty or the community.

Recruitment and Retention of Women and Minorities. SDSU enjoys a national reputation for the successful recruitment and retention of woman and minorities. The fact that SDSU is a university with no majority student ethnic group is evidence of success in recruitment and admissions. But far more importantly is the success of all students, and SDSU is one of the very few research universities in the United States that has essentially eliminated the so-called achievement gap among ethnic groups. All students, including those from minority groups, graduate at approximately the same rate. SDSU is rated 13 in the nation for the number of bachelor's degrees awarded to Hispanics[3].

[2] The Chronicle of Higher Education, 2011-2012 Top Producers of U.S. Fulbright Students by Type of Insitution.

[3] SDSU ranks No. 13 in the nation for bachelor's degrees awarded to minorities, according to the June 2011 issue of Diverse Issues in Higher Education, which listed the top 100 colleges and universities for minorities. No. 25 in the nation for racial diversity – U.S. News & World Report, America's Best Colleges 2011. No. 49 nationwide for master's degrees awarded to minorities. No. 7 in the nation and No. 2 in California for bachelor's degrees awarded to Hispanics, according to the May 2011 issue of Hispanic Outlook in Higher Education, which listed the top 100 colleges and universities for Hispanics. No. 21 in the nation for graduate schools enrolling Hispanics – Hispanic Outlook in Higher Education, April 2010. 5 of 5 Stars for LGBT Friendly Campuses nationwide, according to

Part of our institutional success in this area is the effort to address academic needs of students prior to their matriculation at the university. All incoming students are required to take placement exams in English and mathematics. If students do not achieve the required scores on these exams to demonstrate their academic preparation to undertake university-level coursework in STEM disciplines, they are required to enroll in remedial courses during the summer preceding their fall matriculation at the university. This approach has greatly increased the number of minority students who begin their degree programs with the academic preparation needed to successfully complete the program.

In addition to the academic preparation, our pre-enrollment programs help students learn other skills that enhance their success. For example, helping students learn how to study more effectively, how to use key computer programs used in courses, and where to go when they need help. The pre-enrollment programs also help build new friendships and a sense of community within the cohort, social factors that are correlated with success in college, particularly among underrepresented students and women. Hence, the pre-enrollment programs provide acculturation to the campus environment and resources prior to actual enrollment.

Once enrolled, SDSU offers several programs that support women and minority students. The College of Sciences houses the Center for Advancement of Students (CASA), which includes opportunities for participation in undergraduate research, faculty and peer advising and mentoring, workshops and tutoring. The College of Sciences created this center in 1992 to coordinate and encourage collaboration among programs serving minority and academically and economically disadvantaged students. CASA promotes the academic development of the next generation of underrepresented scientists and health professionals. CASA has developed into a mature program with local and federally funded programs that work cooperatively, sharing resources, developmental activities, and infrastructure support. CASA member programs include: Minority Access to Research Careers (MARC), McNair Scholars program, Initiative for Maximizing Student Development (IMSD), Bridges to the Future, Louis Stokes Alliance for Minority Participation (LSAMP), Faculty Student Mentoring Program (FSMP), Minority Health International Research Training (MHIRT), Native American Research Centers for Health (NARCH), and Institutional Research and Academic Career Development Award (IRACDA).

CASA serves more than 400 minority and disadvantaged students through enrichment courses, seminars, workshops, and faculty/student research participation. COS provides funding to support the CASA director, matching funds for tutoring, enrichment, and workshop courses to improve student retention and success, in-kind and assigned time support for faculty members who provide advising and mentoring for CASA students, and well over 1500 square feet of space to house the various program offices. Representatives from each program interact frequently with one another both informally and via regular weekly meetings, working together to recruit, retain, and facilitate the academic experience and success of STEM students. Many of the activities developed as part of CASA are opened to all students to maximize their impact.

In addition to the CASA programs, the College of Engineering sponsors the MESA Engineering Program, which provides advising, internships and tutoring.

CampusPride.org, July 2010 and 2011. SDSU ranks in the top 200 Colleges for Native Americans, according to Winds of Change magazine 2011-2012. Graduation rates for ethnically diverse students are up from 33 percent in 2002 to 65 percent in 2010—exceeding the rate of increase by students as a whole. SDSU is recognized as one of the nation's top employers for women by Professional Women's Magazine 2010-2011

The lessons we have learned about promoting success of underrepresented students in San Diego are also applicable in Georgia, and address many of the issues facing socially vulnerable students and women that are described in the Georgia 2020: Creating opportunities for inclusive growth report. Based on our discussions with many government and university officials, we plan to implement a pilot program during the first year of the program. This pilot program will involve targeted recruitment from Batumi State University and Kutaisi State University, placement tests for English and mathematics and special support program through faculty and peer advising, and student engagement opportunities. This pilot program will emphasize culturally appropriate services with advice from partner universities as detailed in Sections 9.5.1 and Section 19, responsive to Task 12.

Return on investment. Universities play a key role in a nation's economic security, providing new discoveries in science, technology, and other fields; training entrepreneurial leaders and managers who develop new companies and markets; and training an educated workforce with the skills needed for performing an increasing proportion of the demanding jobs in an advanced, technologically sophisticated global economy. Economists have argued that "the driving force behind the 21st century economy is knowledge, and developing human capital is the best way to ensure prosperity."

4 Integrated Project Plan

To meet the multi-pronged objectives of providing San Diego State University bachelors degrees, building the capacity of Georgian universities in key STEM disciplines, and enabling Georgian universities to achieve ABET or American Chemical Society (ACS) accreditation, we propose a model where SDSU will collaborate with different universities in Tbilisi on specific programs. SDSU will establish a site in Tbilisi at Tbilisi State University where the program will be administered. A Dean for the SDSU-Georgian program will be located at this central site with other key staff responsible for program management. In addition to the central staff, each partner institution will have an on-campus program office with student advisors, recruitment coordinators, and other key staff. The ideal candidate to serve as founding Dean may be a Georgian STEM academic who has lived and worked in the U.S. such that the Dean will be bilingual and bicultural. We will seek advice from our university partners about possible candidates for this critical position. The Dean will coordinate with each of the Georgian partner universities on administering the degree programs. The classroom and laboratory infrastructure for delivery of each of the degree programs will be developed on-site at the partner universities. Core program components that enable lower-division and general education requirements will be located at common sites where students from each of the degree programs can access the expertise needed for competency in these shared requirements.

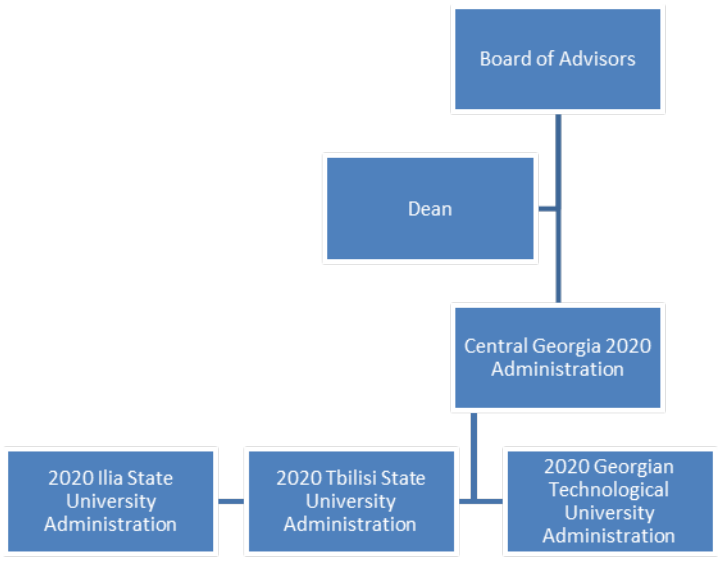


Figure 1. Representation of the overall program structure and administrative resources.

The proposed Georgia 2020 collaborative is built upon a carefully planned, phased-in implementation process that simultaneously takes into account social and cultural conditions in the Republic of Georgia and inherent uncertainties in the development and implementation of such an ambitious and innovative program. The process also pro-actively integrates methodology to minimize potential obstacles or risks to successful implementation and long-term sustainable educational programs ultimately led by the Georgian partner institutions.

San Diego State University has a vision for an innovative degree implementation partnership that uses Academic-Industry-Government alliances to transition existing programs to independent internationally-recognized ABET/ACS accreditation. The proposed implementation plan will leverage the core competencies of each partner institution to facilitate the quick, effective launch of the program. We plan to focus on providing faculty development and mentorship of Georgian faculty at SDSU, renovation of classrooms and laboratories at Georgian institutions, equipment acquisition for the Georgian facilities, and outreach/recruitment strategies for Georgian students during the first year of the project, allowing for the efficient progression to enrollment and instruction during Compact Year 2 (CY2).

Based upon input from the MCA-Georgia, Georgian universities, and Georgian industries, and responsive to the comments of the Technical Evaluation Panel, SDSU will initially offer targeted degree programs in Engineering (including Electrical Engineering and Computer Engineering) and Applied Sciences (including Chemistry with Biochemistry Emphasis or a Computer Science). The Engineering and Applied Science programs share common courses for the first two years, with students focusing on degree-specific coursework after completion of the second year of instruction. The lower-division and general education requirements for these degrees have been integrated to facilitate quality instruction, academic rigor, and educational effectiveness. Of special emphasis for ABET accreditation is the effective implementation of General Education requirements. General education profoundly influences undergraduates by providing the breadth of knowledge necessary for meaningful work, life-long learning, socially responsible citizenship, and intellectual development. SDSU's 49-50 unit General education program, which comprises over one third of an undergraduate's course of study, places specialized disciplines into a wider world, enabling students to integrate knowledge and to make connections among field of inquiry. The substantial amount of coursework required for an SDSU degree

allows Georgia 2020 to prescribe the first two years of curricula in courses that can then be applied to the degree requirements of one or more degrees. These unified general education and lower-division requirements provide the foundation for upper-division curricula in specific disciplines through advanced courses, laboratory work, and design projects that integrate and apply student the knowledge and skills students have acquired. This training will provide students with the skills needed to obtain an internship in Georgian industry. We plan to work closely with Georgian industry and our partner institutions to develop internship opportunities designed to lead directly to employment following completion of the degree. In addition, we will work with Georgian industry partners to develop scholarship support, funds for new equipment, expert advisors, and other opportunities that will help ensure the long-term sustainability of this program.

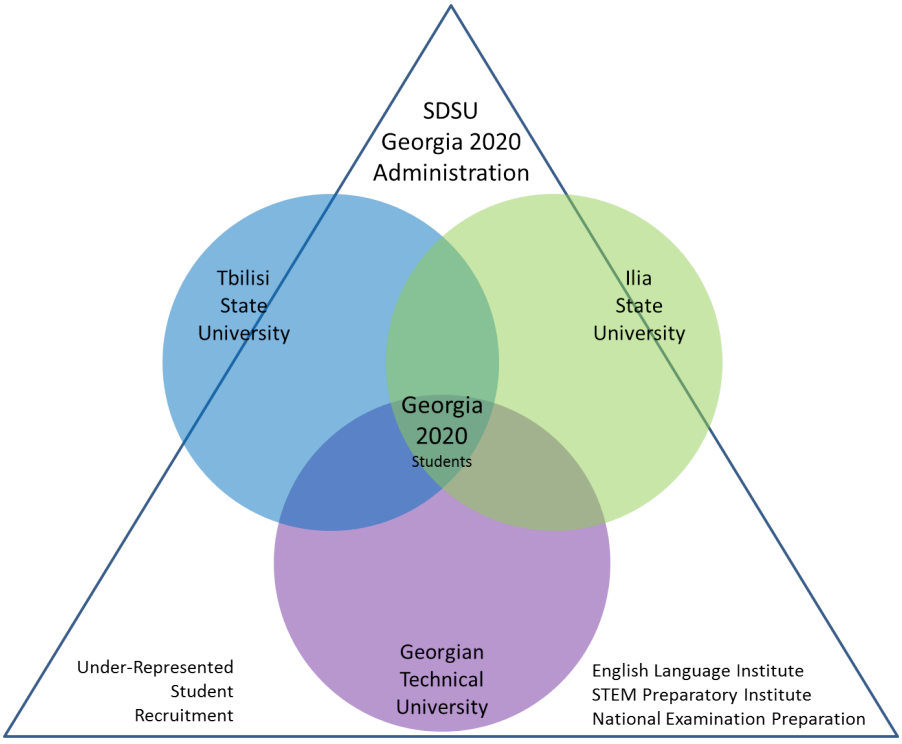


Figure 2. Conceptual design and relationship among the programs and target studend populations.

The overall design of the program is based on the concept that students from all three partner institutions will be able to matriculate into their accredited degree of interest and access appropriate facilities among the partner institutions as relevant to their education. For example, students from Georgian Technological University enrolled in the Chemistry with Biochemistry Emphasis degree program may take advanced laboratory courses at the laboratories installed at Tbilisi State University. Electrical Engineering students at Tbilisi State University interested in a concentration in Power Engineering will similarly be taught upper-division Power Systems and Power Electronics at the upgraded facilities at Georgian Technological University. At the core of the concept is that Georgia 2020 students, while retaining their affiliation with their host institution, will have access to all Georgia 2020 program facilities in pursuit of their degree and approval from academic advisors.

4.1 Joint Venture/Collaborative Structure

The execution of the program will require secure and defined relationships between SDSU and MCA-Georgia, between SDSU and the partner institutions, and among the partner institutions in Georgia.

First, SDSU anticipates establishing a partnership agreement to facilitate funding for the program through a contract with MCC/MCA. SDSU, along with their auxiliary Research Foundation, has broad and deep experience in a variety of contract and grant agreements including cooperative agreements, cost-reimbursable contracts, grants, and other forms of financial research and educational support. SDSU and its Research Foundation has the financial capacity, working capital, and other resources to perform the work as proposed under the contract without assistance from any outside source. For example, the Research Foundation receives approximately 800 new awards each year, and it advances start-up and operating funds as part of its normal course of business. At any one time, as much as $20 million in expenditures are recorded as accounts receivable from various sponsored programs. Also, the Research Foundation, as a non-profit auxiliary for San Diego State University, has its annual A133 audit performed by an agency of the U.S. Department of Health and Human Services.

The final form contract will require both SDSU and in-country legal counsel review prior to entering into the contract. Specific areas of legal research and negotiation will include, but are not limited to, how to best comply with requirements including employment law related to hiring Georgian citizens an long-term working relationships for SDSU faculty and staff, reporting of foreign bank and financial accounts, nonprofit status, applicable personal and value-added tax law, compliance filings, and export control compliance. SDSU will not own any land, buildings, facilities or equipment, but will need access to all relevant facilities and equipment to fulfill the intent of the contract.

In parallel with the contract negotiations with MCC/MCA, SDSU will engage the partner institutions to formalize relations anticipated under the existing MOUs and successful collaboration to-date. We emphasize that SDSU and the partner institutions have worked closely and effectively in good faith to generate the Inception, Interim, and now Final Proposals. This collaboration has involved multiple delegation trips and constant electronic contact. The overarching agreement will be structured as a multi-party Articles of Collaboration, with specific rights and responsibilities governed by targeted sub-agreements that may have the form of sub-contracts, lease agreements, access agreements, or other relevant documents as appropriate.

Of critical importance is the establishment and recognition of the Board of Advisors – a collaborative management group with representation from the major partners and important industry and research stakeholders in Georgia. The Board of Advisors will guide the long-term strategic development of the program and will form the cornerstone of a collaborative process to negotiate resolutions that meet the needs and objectives of all the partner institutions.

Figure 3. Proposed composition of the Board of Advisors.

4.2 Partner institutions

Tbilisi State University, Ilia State University, and Georgian Technological University are among the highest ranking universities in Georgia according to several world rankings of universities. These institutions have executed Memoranda of Understanding (MOU) (Appendix 18) that reflect our institutions' mutual commitment to develop courses and academic programs, joint scientific and technical research programs, exchanges of teaching and research personnel, student exchanges, and

other mutually beneficial activities that enhance academic, research or technical progress at the universities. The SDSU Institutional Leadership and Development Team for the Georgia 2020 project has worked with these universities to identify appropriate disciplines for educational collaboration, and the SDSU leadership team and faculty continue to confer with Georgian faculty and administrators about the curricula that they offer, the recruitment of students, current research, and laboratory facilities.

Ilia State University's Microelectronics and Computer Engineering program was recognized by the ABET review team as being abreast of current technologies with courses providing appropriate and expected content. To reach the next stage of ABET accreditation, cooperative design programs and continuous improvement mechanisms will be incorporated.

At Tbilisi State University, both the Computer Science and Electrical Engineering programs were recognized by the ABET review team as having basic strengths and being good candidates for development into a formal ABET accreditation review. In addition, based upon evaluation of the equipment and personnel and the input of industry, Tbilisi State University was recognized as having the foundation for building a robust degree program that will fuel multiple industries in the Republic of Georgia.

At Georgian Technological University, the Electrical Engineering program is administered by the GTU Faculty of Power, Energy, and Telecommunication. There are several departments of the Faculty, each generally headed by a Full Professor and representing a sub-discipline of electrical engineering or a supporting discipline. Two engineering specialties, namely: Power and Telecommunications were described to the review team, both of which are in the provenance of the EAC of ABET Electrical Engineering Program Criteria. The Electrical Engineering program with a power emphasis was recognized by the ABET evaluation committee as one of the top five programs in terms of readiness for modification and subsequent ABET review. Although the emphasis on power in this program makes it less broad than what ABET defines as basic electrical engineering, the existing professional opportunities and learning outcomes that are stated will be a basis for establishing a good set of program educational objectives and student outcomes. There appears to be good support from the dean and faculty members for addressing the needed changes, subject to the availability of adequate funding.

These bachelor of science degree programs, along with other programs that will be added in subsequent years, were selected based on the interests and capabilities of the partner institutions, as well as the market and workforce development needs, will form the core of degree programs to be initially implemented. Each of the proposed programs has substantial industry needs for qualified STEM professionals, and high potential for stimulating Georgian economic development.

Georgia 2020 will focus first and foremost on successfully implementing the initial programs prior to programmatic expansion. Once the initial programs are running successfully, we will include additional partner institutions, thereby expanding the capacity and access to STEM higher education throughout Georgia. Extending the bachelors degree programs described, Tbilisi State Medical School has signed an MOU with SDSU to cooperate on development of new programs, and discussions continue with Tbilisi State Medical School on developing a masters degree program and advanced certificate programs. Likewise, there are future opportunities to develop joint graduate programs with our other partner universities.

In addition to engineering, growing industrial opportunities in the Republic of Georgia include biotechnology. Two examples of opportunities in biotechnology include human medicine and agricultural biotechnology. Phage therapy is a biotechnology application with a long history in Georgia.

The Eliava Institute in Tbilisi is a world leader in the development and dissemination of phage therapy applications for infectious disease. However, there is a growing international industry focused on this market. Hence, maintaining world leadership will require continued research and development, compliance with international regulations for bio-manufacturing, and aggressive international marketing. A workforce skilled in both STEM and international business will ensure continued world leadership in the phage therapy market. Another example of a major opportunity for the Republic of Georgia is microbial biotechnology, including the production of numerous food supplements (including amino acids, vitamins, etc.), therapeutic agents, and probiotics. Expansion of this industry would both provide a major economic opportunity by exporting these products to other countries, and benefit the agricultural industry by using inexpensive raw materials to produce high value secondary products. The infrastructure, facilities, and expertise at the Richard Lugar Center for Public Health Research will provide valuable collaborative opportunities for developing and optimizing microbial biotechnology related businesses.

We have signed MOUs with the Eliava Institute and the Richard Lugar Center for Public Health Research to collaborate on curricular and research programs as they become feasible under the Georgia 2020 development plan. Likewise, we have had productive discussions with the Ministry of Agriculture about needs and opportunities for agriculture biotechnology applications. Engineering applications in medical devices and mobile diagnosis, and biomedical informatics applications are also robust biotechnology opportunities for economic development that rely upon the highly educated workforce that our program will produce.

All of our partner institutions have close ties with a variety of industry collaborators, and we made additional contacts during visits of our STEM administrative team to the Republic of Georgia. We will continue to build upon these industry-academic opportunities, and develop more collaborations with industry as the Georgia 2020 program progresses. These connections will both enhance student training by providing internships for current students and job opportunities for graduates, and develop support programs that provide student scholarships, equipment, and expert speakers. These collaborations will ensure the long-term sustainability of Georgia 2020.

5 Phased Implementation

The SDSU Institutional Leadership and Development team solicited input from our partner institutions and thoroughly evaluated existing and planned curricula in the target disciplines. This process included multiple visits to the partner universities with tours of laboratory facilities and in-person discussions between faculty, discussions via SKYPE, numerous email communications, and an intensive working trip sponsored and hosted by SDSU on January 27-29, 2014. The table below outlines the Georgian Delegation that participated in this planning conference.

Table 1. Composition of partner institution planning delegation.

Georgian Technological University	
Dr. Nikoloz Abzianidze	Professor Faculty of Power Engineering and Telecommunications
Dr. Alexander Milnikov	Professor Computer Technologies and Engineering/Informatics
Ilia State University	
Dr. Mikheil Elasvili	Dean of the School of Engineering
Dr. Gigi Tevzadze	Rector

Tbilisi State University	
Dr. Ramaz Botchorishvili	Dean, Exact and Natural Sciences
Dr. Marine Chitashvili	Vice Rector
Dr. Nino Inasaridze	Executive Coordinator
Consultant	
Dr. Nino Chubinidze	Expert in quality assurance and Georgian accreditation

The Georgian partner institutions have established the academic framework to offer bachelors degrees in STEM disciplines. To extend the existing framework to meet the requirements of an SDSU degree with the rigorous instruction and assessment needed for ABET/ACS accreditation, the Georgia 2020 collaborative will use an implementation-evolution-transition process.

To facilitate rapid implementation and based upon input from the MCA-Georgia, Georgian universities, and Georgian industries, SDSU will begin providing lower-division and general education curricula relevant to four terminal degrees in CY2. This approach will (1) allow the program to recruit the target student population during CY1, (2) facilitate quality instruction, academic rigor and educational efficacy by unifying the first two years of curricula in schedule that can be applied to the degree requirements of more than one degree, (3) build a cohesive student body, and (4) allow needed renovations and instrument installation prior to the laboratory intensive upper-division coursework.

Under consultation with the partner institutions, Georgia 2020 will use a launch strategy that leverages the first compact year (CY1) to establish a program office with appropriate recruiting and outreach capabilities, and the subsequent years to implement the educational programs. CY1 will focus on constructing and/or renovating facilities, recruiting students, training faculty and staff, enhancing existing relationships with partner institutions, and developing additional relationships with academic, industry, and government institutions to further enhance the quality and impact of the Georgia 2020 program.

Responsive to the comments of the Technical Review Panel relevant to review criterion 3, Georgia 2020 has developed a portfolio of enrollment strategies that will target high school students prior to their National Examination date (ensuring opportunities to improve English language and STEM proficiency, and National Examination performance), as well as offer “ramp-up” opportunities for partner institution students about to begin their course of instruction, or already in their first year of instruction. These enrollment strategies will be further detailed in the appropriate Task below.

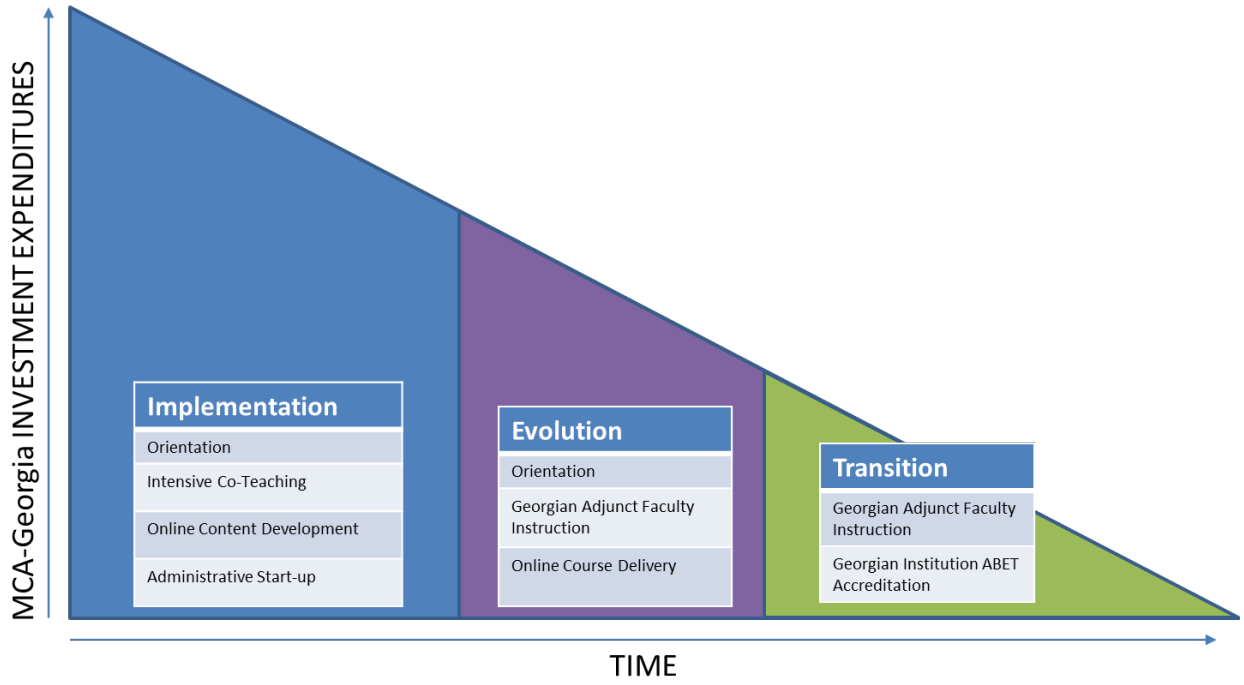


Figure 4. As the program progress, MCA Investment expenditures (primarily in capacity building) will decline, and the responsibilities of the Georgian partner institutions will take precedence.

5.1 Implementation

During the initial phases of the program, the focus will be on identifying and collaborating with Georgian partner institution faculty who are interested in modifying their course, including course content, teaching mode, laboratory experiences, and assessment, to match existing SDSU and ABET/ACS requirements. Georgia 2020 will use a differentiated approach appropriate to each partner institution. For example, Ilia State University has made substantial progress in establishing and delivering a General Education curriculum and appropriate English language training in collaboration with the British Consulate in Tbilisi. Tbilisi State University has established appropriate approval and mechanisms that recognize the value of General Education requirements, but is still working on formalizing their GE offerings and evaluations. In addition to General Education requirements, discipline-specific and upper-division teaching collaboration will be facilitated by the teaching modalities described in detail below. Selected Georgian faculty members will be hosted at SDSU to gain experience with teaching approaches used at SDSU and to integrate SDSU curricula into their own instruction. SDSU faculty will continue to co-teach courses through in-person instruction, intensive instruction hybrid courses, or online approaches until the collaborative faculties of both SDSU and the host institution agree that the curriculum is sufficiently robust for independent ABET/ACS accreditation. During these visits to SDSU, Georgian faculty will live on campus and work closely with SDSU faculty to gain experience in teaching and assessing the course according to ABET standards, including training on use of the equipment and software to be purchased for the Georgian partner institution.

5.2 Evolution

During the Evolution phase, collaborating Georgian faculty will adopt increasing responsibility for direct implementation and instruction of the approved curriculum. During this phase, we will continue to collaborate through in-person co-teaching and online mentorship to ensure continuity with ABET/ACS

approved practices, but faculty in Georgia, who will also retain an adjunct SDSU Faculty/Lecturer appointment, will manage the majority of the instruction.

5.3 Transition

During and after completion of the Transition phase, SDSU-hosted faculty will serve in an advisory and evaluation role as the Georgian partner institutions pursue independent ABET and ACS accreditation for the modified curricula to be taught directly by the Georgian institution. During this period, cohort students will continue to receive SDSU degrees, but at some point during the program period, the degree-awarding institution will be transitioned fully to the Georgian institution, upon receipt of ABET/ACS-accreditation. SDSU faculty will continue to provide support as needed after this transition.

A potential timeline for the transition process for the first bachelors degree programs is shown below.

Table 2. Notional transition timeline. Early in the program, instruction will mainly consist of lower division courses for which the Georgia faculty are well-prepared to implement rapidly. As courses increase in complexity and reliance on advanced instrumentation, the transition process may take longer. Transition plans may be modified based on the performance of collaborating faculty as needed.

Academic Year	Freshman	Sophomore	Junior	Senior
2014-15				
2015-16	SDSU / G			
2016-17	G / SDSU	SDSU / G		
2017-18	G	G / SDSU	SDSU / G	
2018-19	G	G	SDSU / G	SDSU / G
2019-20	G	G	G / SDSU	SDSU / G
2021-22	G	G	G / SDSU	G / SDSU
2022-23	G	G	G	G / SDSU
2023-24	G	G	G	G
2024-25	G	G	G	G

SDSU/G = SDSU responsible for instruction with Georgian facilitator; G/SDSU = Georgian faculty member responsible for instruction with SDSU facilitator; G = Georgian faculty responsible with SDSU input and advice.

During the transition of the initial degree programs, we will focus on development of additional STEM bachelors degree programs and developing additional partner institutions. This process will continue throughout the 20-year contract with MCA-Georgia.

6 Program Management

6.1 Introduction

Georgia 2020 is a collaborative academic, industry, government, and non-profit partnership that will leverage the strengths and assets of its partners and stakeholders to optimize delivery of accredited Bachelor of Science degrees in in Engineering and Applied Sciences, including Electrical Engineering, Computer Engineering, Chemistry with a Biochemistry Emphasis, and Computer Science. After developing these initial degree programs, Georgia 2020 will add several additional STEM degree programs that were noted as areas of high demand and opportunity by partner institutions, specifically Civil and Construction Engineering. Georgia 2020 will use a common academic institutional

infrastructure that will provide appropriate leadership, oversight, and opportunities for collaboration to ensure continuous program improvement, and implementation consistent with the cultural and social environment of the Republic of Georgia.

Responsive to the Technical Evaluation Panel comments relevant to evaluation criterion 4, Georgia 2020 has bolstered the US-led administrative team, and provided each program office with appropriate Student and Faculty affairs and administrative support staff.

6.1.1 Recruiting

The Georgia 2020 collaborative recognizes that a core objective of the capacity building effort is to stimulate participation from women and underrepresented groups (ethnic minorities, rural students, and economically disadvantaged students). SDSU has multiple federally-funded training programs (including $2.8 million for a 5-year National Institutes of Health Initiative for Maximizing Student Diversity Program directed by Bill Tong, Chair of Department of Chemistry and Biochemistry, and approximately $4 million for a 5-year NIH Minority Access to Research Careers Program co-directed by Stanley Maloy, Dean of the College of Sciences). SDSU faculty has extensive experience with the recruitment and training of underrepresented students from the United States as shown in the table below.

Table 3. SDSU is a place of inclusive diversity. Rankings and recognition are summarized below.

San Diego State University Diversity	Web site	Date
SDSU is a place of inclusive diversity, where students from all backgrounds have access to a transformative education. Programs such as Minority Access to Research Careers, Price Scholars and Guardian Scholars support students who achieve academic excellence. These students move on to prestigious Ph.D. programs at universities such as Harvard and MIT or into responsible positions with leading employers.	http://www.sci.sdsu.edu/marc/; http://www.pricefamilyfund.org/Grants-At-Work/Price%20Community%20Scholars/Default.aspx; http://eop.sdsu.edu/Content/Guardian%20Scholars.html	3/13
SDSU ranks No. 19 in the nation for campus ethnic diversity, according to the 2012 U.S. News & World Report's "America's Best Colleges."	http://colleges.usnews.rankingsandreviews.com/best-colleges/rankings/national-universities/campus-ethnic-diversity	3/13
The 2012 freshman class is the most ethnically diverse and among the highest achieving cohorts SDSU has ever enrolled. Fifty-six percent self-identify as students of color, and 30 percent as Hispanic.		3/13
SDSU ranks No. 20 in the nation for bachelor's degrees awarded to minorities, according to a 2012 issue of *Diverse: Issues in Higher Education magazine.*	http://diverseeducation.com/top100/BachelorsDegreeProducers2012.php?AppKey=38d31000g2h3a9a0b3f1b9i5j0e0&ComparisonType1_1=%3D&MatchNull1_1=N&school=San+Diego+State+University&ComparisonType2_1=%3D&MatchNull2_1=N&state=zip&ComparisonType3_1=%3D&MatchNull3_1=N&major=zip&ComparisonType4_1=%3D&MatchNull4_1=N&race=Total+Minority	3/13
SDSU is ranked No. 11 in the nation for bachelor's degrees awarded to Hispanics, according to a 2012 issue of *Hispanic Outlook in Higher Education* magazine.	http://www.hispanicoutlook.com/top-100-schools/view-by/bachelors/	3/13
SDSU ranks among the top 100 in economic diversity. Ranked No. 8 in the nation for students graduating with the least amount of debt, SDSU has raised more than $40 million for scholarships in the past five years.		3/13
The federal government classifies SDSU as a Hispanic-Serving Institution, and Hispanic Outlook in Higher Education ranks SDSU among the nation's leaders in degrees awarded to Hispanics: 11th in bachelor's degrees and 25th in master's degrees.		3/13
SDSU is listed as a top LGBT-friendly campus in the nation, receiving 5 of 5 Stars from CampusPride.org.	http://www.campusprideindex.org/details/premium.aspx?ID=330	3/13
Recognized as a veteran-friendly university, SDSU educates more than 1,200 student veterans. They are served by the Joan and Art Barron Veterans Center and by the on-campus Veterans House, which was the first student-veteran residence of its kind when opened in 2009.		3/13
SDSU is among leading universities chosen for INSIGHT Into Diversity's Higher Education Excellence in Diversity (HEED) Award, recognizing U.S. colleges and universities that demonstrate an outstanding commitment to diversity and inclusion.	http://www.insightintodiversity.com/heed-awards/insight-into-diversity-congratulates-the-2013-higher-education-excellence-in-diversity-award-honorees	9/1
SDSU has been identified by The Education Trust for the second time as a model for improving graduation rates, especially among students of color and low-income students.	http://www.edtrust.org/dc/press-room/press-release/the-education-trust-re-releases-college-results-with-new-data	1/31

We will use insights from our successful programs to recruit, integrate, and retain socially disadvantaged groups from the Republic of Georgia. Based upon our experience, multiple approaches are required to reach these disadvantaged student populations. Students from existing pipeline communities, as well as those from socially disadvantaged groups will be actively recruited via educational outreach coordinators in collaboration with Georgian national priorities and cultural norms. Relevant social media (Twitter, Facebook, Linked-In, YouTube, etc.) will be maintained as outreach venues for engagement of prospective students. Promotional material describing the Georgia 2020 project will be distributed at education and career fairs in urban and rural settings. Presentations will be made to student and professional groups, and at relevant student orientations and conferences. Outreach will be coordinated with local schools and academic advisors and counselors throughout Georgia. We will collaborate with K-12 STEM education programs to distribute information about Georgia 2020 to schools with rural and underrepresented students. In addition, we will consult with government, industry, and non-profit

organizations to recognize groups with unmet educational needs that require focused recruitment efforts.

As part of the in-country planning process, SDSU has already met with industry collaborators like Delta Systems and BP to evaluate ongoing efforts to improve K-12 STEM education. In addition, Georgia 2020 will actively seek to leverage the MCA primary education group once they are chosen.

The College of Sciences, College of Engineering, and other colleges at SDSU partner with the College of Extended Studies to offer a wide variety of programs to meet the educational needs of different constituents. The College of Extended Studies has extensive experience in designing and supporting recruitment and enrollment processes. As partners, these SDSU colleges will leverage their core capabilities to support outreach, training and recruitment in collaboration with participating Georgian partner institutions. Georgian partner institutions will have co-equal responsibility for recruiting and enrolling students according to their own programmatic requirements.

6.1.2 General Education Requirements

The General Education (GE) requirements for SDSU bachelors degrees have been standardized for the Georgia 2020 collaborative to streamline the curricula across the four initial degrees.

The curriculum will require substantial GE coursework in the first two years of study (including technical courses that are both required for the degree *and* credited as General Education). Where possible courses already offered at the degree partner Institution (e.g., Math 150 – Calculus I, or approved Humanities courses) will be evaluated at SDSU according to existing approved processes for awarding credit for courses from international institutions and according to ABET/ACS standards for accreditation.

At American universities, the GE requirements constitute the core of the curriculum for all undergraduate students, regardless of the majors they select, including the STEM disciplines. GE courses provide a solid academic, intellectual, and practical foundation for all undergraduate students by creating the breadth of knowledge necessary for meaningful work, lifelong learning, socially responsible citizenship, and intellectual development. The 50-unit program, which comprises over one third of an undergraduate's course of study, places specialized disciplines into a broader context, enabling students to integrate knowledge and make connections among fields of inquiry. The SDSU GE Program prepares students to succeed in an increasingly complex and rapidly changing world. Students will live and work in the context of globalization, scientific and technological innovation, cross-cultural encounters, environmental challenges, and unforeseen shifts in economic and political power. Through this GE program, students will acquire knowledge of human cultures and the physical and natural world that will enable them to engage significant questions, both contemporary and enduring. At SDSU, students develop seven essential capacities through GE:

- Construct, analyze, and communicate arguments
- Apply theoretical models to the real world
- Contextualize phenomena
- Negotiate differences
- Integrate global and local perspectives
- Illustrate relevance of concepts across boundaries
- Evaluate consequences of actions

The skills acquired in these GE courses are critical for the college-educated workforce to be competitive in the global economy. Furthermore, U.S. accreditors (including ABET and ACS) require a robust GE program be incorporated into the curricula.

6.1.3 Evaluation/Assessment/Admissions

Georgian students applying for entry to the Georgia 2020 collaborative are expected to be high performing and highly motivated to acquire an internationally-recognized degree. To be considered for admission, students will have to submit an Enrollment Application Form, evidence of benchmark or higher achievement on Georgian entrance exams in General Aptitude, English Language, and Mathematics, and an approved English language test score that meets SDSU entrance requirements for international students. For example, this requirement could be met by earning a score of 6.5 on the International English Language Testing System (IELTS) administered in Georgia at the British Council in Tbilisi, a score above 80 on the Test of English as a Foreign Language (TOEFL), or a passing score on an exam administered by SDSU. Underrepresented students who are qualified except for their English language skills may be invited to take part in an English language program, designed to enhance English communication skills. After achieving competency in English, these students may be admitted to the degree program. SDSU will set the benchmark entrance requirements in collaboration with the partner institutions, and the requirements may be higher than the minimum requirements for admission presently used. In addition, non-academic factors such as social/cultural background, personal statements or other review criteria may be used in lieu of, or in addition to the benchmark requirements to justify admission.

Upon acceptance to the Georgia 2020 program, the incoming students will be required to take the appropriate SDSU placement examinations, including the Precalculus Proficiency Assessment and the Chemistry Placement Examination to facilitate appropriate placement within the curricular path.

7 Task 1 – Identify programs to be offered

7.1 Task 1a – Indicate at least three bachelor degrees that meet the standards of quality instruction

In response to the Technical Evaluation Panel comments relevant to evaluation criterion 1, Georgia 2020 has reduced the number of initial degree offerings from six to four degree programs. This modification allows for greater focus on enrollment and development of the initial offerings. Although only four degree programs will be offered for enrollment in CY1, maintaining the educational core structure that targets GE requirements in the first two years of instruction allows the program to retain flexibility to offer additional degree options in later years with minimal additional requirements for the students.

Georgia 2020 students will be required to choose a major by their sophomore year. Students will be able to select from four different degree programs: (1) Electrical Engineering, (2) Computer Engineering, (3) Chemistry with an Emphasis in Biochemistry, and (4) Computer Sciences. Pending successful enrollment and construction/development of facilities and faculty a degree in Civil/Construction Engineering will be enrolled starting in CY3. Existing Georgia 2020 students may also be invited to transfer to that degree program depending on their status and progress and the capacity of the program at CY3. Additional degree programs including Biotechnology, Environmental Engineering, Bioengineering, and other high demand STEM fields may be added in subsequent years based upon need and opportunity.

Georgia 2020 will ensure quality of instruction, academic rigor, and educational effectiveness by implementing the existing ABET/ACS accredited SDSU STEM curriculum in collaboration with partner

institution faculty. Georgia 2020 students will initially receive SDSU Bachelor of Sciences degrees, ensuring that the program rigor will be equivalent to that provided on the campus in San Diego.

7.1.1 General Education Standards of Instruction

All ABET-evaluated programs in the country of Georgia were found to need improvement in the criterion addressing "the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context". To directly address this requirement, and simultaneously ensure quality instruction, academic rigor, and educational effectiveness, the curriculum will include 50 units of rigorous GE instruction corresponding to the existing accredited curricula of SDSU. Many of the GE courses will be initially co-taught by instructors from SDSU and the partner institution to facilitate the approval of partner institution faculty as adjunct faculty at SDSU. The SDSU GE curriculum content consists of the following (specific courses are outlined later in the curriculum section of the proposal):

I. Communication and Critical Thinking (9 units)
II. Foundations of Learning (29 units, lower division)
    A. Natural Sciences and Quantitative Reasoning (including physical sciences, life sciences, laboratory, and mathematics/quantitative reasoning)
    B. Social and Behavioral Sciences
    C. Humanities (including literature and foreign languages)
III. American Institutions (3 units)
IV. Explorations of Human Experience (9 units, upper division)
    A. Natural Sciences
    B. Social and Behavioral Sciences
    C. Humanities

Some course offerings of the partner institutions may overlap with existing SDSU GE requirements and be eligible for acceptance under GE requirements of the degree. The partner institutions have integrated GE requirements differentially according to their capacity and investment in GE education, and SDSU will apply a differential assessment model to confirm appropriateness of existing GE courses.

The current partner institution curricula include a number of courses that overlap with the SDSU GE requirements. This will allow us to leverage the existing expertise, while the close collaboration between faculty from both institutions will ensure that the topics and quality of instruction are equivalent to existing SDSU ABET- and ACS-accredited programs.

Examples of courses already taught at partner institutions that have the potential to be integrated into the accredited curriculum include:

- Introduction to Economics and Management
- Introduction to Information Technologies
- Introduction to Modern Thought I and II
- Introduction to Geo-Information Systems
- Calculus I to IV
- Probability and Statistics
- Computer Processing of Visual Information I and II
- English Language Practical Courses
- Presentation and Communication Skills
- Earth Sciences

- Origin and Evolution of the Universe
- Historical Earthquakes
- Volcanos, Caves, and Waterfalls of Georgia
- Vital Resources of Modern Civilization of Earth
- Cosmology – Theory of the Origin and Evolution of the World
- From Zoroastrianism to Artificial Intelligence
- The Role of Nature's Laws in Our Life
- Mysteries of Micro and Macro World
- The First Steps in Painting and Drawing 1 and 2
- Introduction to Biology
- Introduction to Geography
- Introduction to Geology
- Introduction to Ecology
- Introduction to Physics
- Introduction to Chemistry
- Introduction to Scientific Reasoning
- Introduction to General Mathematics
- Introduction to Artificial Intelligence
- Mathematics (calculus courses, linear algebra, statistics courses)
- Introduction to Food Analysis
- Foreign Language 1 and 2
- Theory of Evolution
- History of Science
- English Courses (beginning to advanced)
- History of Chemistry
- Chemistry and Civilization
- Psychology of Development of Children and Young Adults
- Social and Economic Geography of Georgia
- Physical Geography of the World
- Social and Economic Geography of the World
- Geography of Nature Use
- Environment Transformation
- Regional Geography of Georgia
- Natural Resources of Caucasus
- Applied Geography
- Georgia in World

7.2 Task 1b – Identify Partner Institutions

The Georgia 2020 program offers a unified opportunity to the students from the initial partner institutions to matriculate into a degree program of their preference, regardless of the location of resources. This approach represents a sea-change in terms of collaboration, student mobility, and cross-pollination of ideas and human capital. The distribution of instructional capacity among the partner institutions is reflected by the renovation of laboratory infrastructure. Details can be found in the budget appendices, but the summary table below, when taken together with the narrative to follow, will aid in clarifying this complex program.

Table 4. Laboratory and classroom renovations for Engineering and Computer Sciences

Georgian Technological University	Ilia State University	Tbilisi State University
General EE Lab	General EE Lab	General EE Lab
Computer Classroom	Computer Classroom	Computer Classroom
Storeroom	Storeroom	Storeroom
Laboratory Office	Laboratory Office	Laboratory Office
Senior Design Lab	Senior Design Lab	Senior Design Lab
Lecture Hall	Lecture Hall	Lecture Hall
Library Digital Media	Library Digital Media	Library Digital Media
Power Systems Lab	Computer Lab	Computer Lab
Hydraulics Lab	Structural Lab	Smart/Computer Class
Geotechnical Lab	Geotechnical Lab	Digital Communications Lab
Surveying Lab	Surveying Lab	
	Hydraulics Lab	Intro to Physics
Power Electronics Lab	Antenna & Microwave Lab	

Table 5. Laboratories to be renovated for initial Chemistry degree requirements.

Georgian Technological University	Tbilisi State University
Chemistry GE 101/201	Chemistry GE 101/201
Chemistry 567	Chemistry 232/432
	Chemistry 417-427-457
	Chemistry 457 Special
	Chemistry 567

7.2.1 B.S. degrees in Electrical Engineering and Computer Engineering

The initial focus on lower division and general education requirements during the implementation phase will provide appropriate structure and rigor to streamline these programs and address the subtle but significant findings of the ABET review team related to structure, flexibility, and facilities.

Based upon our experiences in Georgia and discussions with faculty from each of the partner institutions, we believe that the presence of key program components all partner institutions will evolve to serve important subdisciplines that will provide economic opportunities for the graduates of each program and for the Republic of Georgia. For example, Electrical Engineering is a primary degree, but there are important opportunities to focus on specialization in subdisciplines such as a concentration in Power Energy at Georgian Technological University and Microelectronics at Ilia State University.

By implementing these degrees at all three partners, Georgia 2020 will simultaneously leverage the existing infrastructure for electrical engineering at Tbilisi State University, microelectronics at Ilia State University, and Power Engineering at Georgian Technological University. These programs received a favorable preliminary evaluations from the ABET review team, and the review also noted opportunities for faculty development and facilities in Computer Engineering and Microelectronics at Ilia State University – a degree program with shared laboratory facilities and natural disciplinary synergies with Electrical Engineering. At Georgian Technological University, the Power Energy (Electrical Engineering) curriculum was recognized by the ABET evaluation committee as one of the top five programs in terms of readiness for modification and subsequent ABET review. Although the emphasis on power in this

program makes it less broad than what ABET defines as basic electrical engineering, the existing professional opportunities and learning outcomes that are stated will be a basis for establishing a good set of program educational objectives and student outcomes. There appears to be good support from the dean and faculty members for addressing the needed changes, subject to the availability of adequate funding.

7.2.2 B.S. in Chemistry with an Emphasis in Biochemistry, and B.S. in Computer Science at Tbilisi State University

Tbilisi State University will host the Chemistry/Biochemistry and Computer Science degrees. SDSU anticipates through the Georgia 2020 project to make major investments in chemistry laboratory facilities at Tbilisi State, and other upper-division investments at Georgian Technological University. These laboratories will be appropriate to integrate advanced biological and biotechnology processes to develop future certificate and degree programs as appropriate to promote the economic development of the Republic of Georgia.

Chemistry degrees in the U.S. are certified by the American Chemical Society (ACS), the world's largest scientific society. Based upon our visit to partner institutions in Georgia, input from industry leaders in Georgia, and the opportunity for workforce development, it is clear that Chemistry with an emphasis on Biochemistry and future biotechnology certificate programs can be another priority target for the Georgian economy. The skills taught in the chemistry curriculum are also crucial for agricultural engineering, bioengineering, and other disciplines. Similar to the other programs, Tbilisi State University has implemented a good foundation for the degree. However, the curriculum retains significant gaps that impede international recognition of the degree program, and the available laboratory equipment and infrastructure needs considerable updating to meet modern standards. Therefore, SDSU will apply the implementation-evolution-transition model to support the development of local capacity to provide internationally accredited instruction in these fields that are crucial for numerous other STEM disciplines and for Georgian industry.

Our evaluation, supported by the evaluation of the ABET review team, indicates that limited modifications are needed for the Tbilisi State University Computer Science program to be ABET-accreditation eligible. There is considerable student demand for Computer Science training, and there are many exciting opportunities for developing and expanding computer-related industries in Georgia. With additional laboratory science courses and nontechnical general education courses, the Computer Science degree will be very close to the Transition phase. Nevertheless, some modification is still necessary so, like the other curricula, this degree program will adopt an implementation-evolution-transition process. We anticipate that the time required to Transition the Computer Science B.S. degree at Tbilisi State University will be considerably shorter than the other programs based on the current evaluation of this program.

7.2.3 Future Program Plans Compact Year 3 - B.S. in Civil/Construction Engineering

Based upon the evaluation of the SDSU team, including the Chair of the SDSU Civil, Construction, and Environmental Engineering Department, and further substantiated by the ABET site review team, there is great enthusiasm for the Civil Engineering program at Ilia State University. Nevertheless, there remain substantial functional gaps that need to be addressed prior to ABET accreditation of this program. Therefore, the Georgia 2020 collaborative will develop the framework and infrastructure to implement the SDSU ABET-accredited Civil and Construction Engineering degree programs using the articulated implementation-evolution-transition model.

By delaying enrollment into this program, Georgia 2020 is using the delay as a risk-mitigation strategy to focus on two primary developmental milestones. First, Georgia 2020 will build a new building on land provided by Ilia State University to house the Civil/Construction Engineering, and additional Electrical Engineering and Computer Engineering resources. Although SDSU has received, and is submitting for review under this proposal, detailed time and cost proposals for the construction of the building, it is well-known that construction can, through no fault of the contractors, be unexpectedly delayed. Therefore, the needs for the Civil/Construction Engineering program will be delayed not only by the initial start-up period, but once enrollment begins, courses that require the new facilities will not be offered for another two years, while the first cohort of Civil/Construction Engineering students complete their lower division and GE requirements.

Second, although there is great enthusiasm, need and demand for the degree program, we anticipate challenges identifying and training qualified instructors to deliver the approved course material. To mitigate this risk, Ilia State University and SDSU have developed a strategy parallel to the proposed Georgia 2020 faculty development plans that would identify current Georgian students qualified for entry into US graduate programs (SDSU's included, but not exclusively SDSU). These students would be eligible for limited assistance in identifying appropriate Ph.D. mentors, and defining thesis projects where the subject of study is located *in Georgia*. These students would be collaboratively supervised, deepen their ties to the Civil/Construction community, and, by the time they are needed as instructors at Ilia State University for upper-division Civil/Construction courses, have completed their Ph.D. work. Ilia State University has established fellowship opportunities to partially support costs associated with the education of these future faculty.

Ilia State University has developed a draft curriculum for Civil Engineering that aims to teach design, planning, and improvement of the built environment. This curriculum builds upon existing strengths in Architecture and Geological Sciences. The draft degree, like that offered by SDSU, encompasses several sub-disciplines, including hydraulics and hydrology, structural engineering, geotechnical engineering, environmental engineering, transportation engineering, and other related areas. Using the proposed format for this degree, which requires 8 semesters of instruction and ~6000 contact hours, Georgia 2020 will leverage collaborative teaching methods to integrate existing ABET-accredited SDSU curricula with the teaching format already in place. Although there is an existing foundation for the degree, after careful review of the requirements and teaching modalities, the collaborative model of transferring courses and curricula from the ABET-accredited SDSU program will provide the most efficient approach to achieve rapid ABET accreditation of the Ilia State University Civil and Construction Engineering programs. Thus, this will be the fastest approach to building capacity in these disciplines and to begin to produce highly-qualified graduates to enter the Georgian STEM workforce.

In parallel with the proposed Ilia State University program, laboratories will be improved at Georgian Technological University to further incentivize and support direct enrollment from all partner institutions. Georgian Technological University has extensive Civil Engineering assets, but the curriculum and certain ABET-required components are still deficient in the program. However, the strength of the faculty and the size of the student body make Georgian Technological University an excellent partner to extend the impact of the proposed Civil/Construction Engineering program.

7.3 Task 1c – Other Complementary Programs

Competence in science and engineering demands training in a wide variety of skills, and provides opportunities for industry development outside of the target disciplines. In addition to the proposed four B.S. degree programs, hybrid degrees combining two or more disciplines and specialized certificates recognizing expertise in specific topics may be included after the initial programs are up and running. In

general, graduates will be expected to have experience performing and trouble-shooting a large number of techniques prior to entering the workforce, which will enhance the applicability of their degrees.

Table 6. Potential topics for instruction under future certificate programs.

Skills required for building the Biotechnology and Pharmaceutical Industries:	
Basic microbiology	Basic database analysis
Cell culture	HPLC, BC, HPCE, LCMS, GCMS, FPLC
Basic cloning techniques	Computational chemistry
Genomics and metagenomics	Molecular biology, FTIR, Raman Spectroscopy
Bioinformatics	Synthetic organic chemistry
PCR and qPCR	Mass spectrometry
Fluorescence microscopy	Analytical chemistry
Fluorescence activated cell sorting (FACS)	Modern instrumental methods of analysis
Biochemistry and analytical chemistry	Nuclear Magnetic Resonance

Some key industry opportunities in the Computer Sciences industry:	
Database analysis	Domain-specific computing
Telecommunications	Molecular engineering
Remote sensing	Cell control
Informatics	Cybersecurity

Some key topics in the Energy/Civil/Construction Engineering sector:	
Basics of hydroelectric energy	Petroleum acquisition and processing
Coal	Natural gas
Nuclear energy	Water resources
Renewable energy	Solar energy
Storage and transmission of electrical energy	Earthquake resistant design

The remainder of this page is left intentionally blank.

7.4 Task 1d – Letters of Commitment

The remainder of this page is left intentionally blank.

THE CALIFORNIA STATE UNIVERSITY

OFFICE OF THE CHANCELLOR

BAKERSFIELD
CHANNEL ISLANDS
CHICO
DOMINGUEZ HILLS
EAST BAY
FRESNO
FULLERTON
HUMBOLDT
LONG BEACH
LOS ANGELES
MARITIME ACADEMY
MONTEREY BAY
NORTHRIDGE
POMONA
SACRAMENTO
SAN BERNARDINO
SAN DIEGO
SAN FRANCISCO
SAN JOSÉ
SAN LUIS OBISPO
SAN MARCOS
SONOMA
STANISLAUS

October 30, 2013

Mr. Dimitri Kemoklidze
Procurement Director, MCA-Georgia
Millennium Challenge Account-Georgia
4 Sanapiro Street
Tbilisi 0105, Georgia

Dear Mr. Kemoklidze:

As chancellor of the California State University, the largest and most diverse university system in the United States, I was extremely pleased to learn that San Diego State University (SDSU) is one of three finalists to partner with Georgian Universities for capacity building and offering undergraduate programs in the STEM disciplines. This higher education initiative, I understand, is a significant component of the second compact of the Millennium Challenge Corporation, chaired by John Kerry, U.S. Secretary of State, with the Republic of Georgia.

San Diego State is a national research university with extensive experience in working collaboratively with universities throughout the world. This project will benefit the students and faculty of both SDSU and the Georgian institutions through academic exchange, joint research, and other type of academic collaborations. Moreover, SDSU has also partnered with local industry to promote economic development as well as provide an educated labor force, and these university-industry partnerships have contributed to the development of San Diego as one of the most vibrant high-tech regions in the world.

Based on this experience, SDSU will be an outstanding university to work with MCA-Georgia and the Georgian universities in science and engineering for capacity building and degree offerings; I strongly support SDSU's work in this vital project to advance higher education in the Republic of Georgia.

Sincerely,

Timothy P. White

Timothy P. White
Chancellor

401 GOLDEN SHORE • LONG BEACH, CALIFORNIA 90802-4210 • (562) 951-4700 • Fax (562) 951-4986

San Diego State University
5500 Campanile Drive
San Diego, CA 92182-8000
Tel: 619 594-5201
Fax: 619 594-8894

THE PRESIDENT

March 18, 2013

George Zurabashvili
CEO
MCA-Georgia

Re: Selection of Partner Institution(s) for Capacity Building and Establishing Bachelor Degree Programs in STEM Higher Education in Georgia

Dear Mr. Zurabashvili:

San Diego State University is strongly committed to establishing bachelor degree programs in STEM higher education and building capacity in Georgia in partnership with Ilia State University and Tbilisi State University.

Our representatives for this project, Dean Stanley Maloy of the College of Sciences and Dean Paul Wong of the College of Arts and Letters, have just returned from Tbilisi, where they conferred with MCA-Georgia, representatives from ministries in the Georgian government, parliamentary leaders and NGOs, as well as Rector Gigi Tevzadze of Ila State and Rector Alexander Kvitashvili of Tbilisi State.

We have signed memoranda of understanding with our university partners and with two major research institutes in Georgia – the Richard G. Lugar Center for Public Health Research, directed by Anna Zhvania, and the G. Eliava Institute of Bacteriophages, Microbiology and Virology, directed by Ambassador Revaz Adamia.

These meetings in Tbilisi were highly informative as we prepare to submit our proposal in response to your RFP. We now have a better understanding of the state of higher education in Georgia with respect to STEM disciplines and of the human capital needs of your country in the public, private, and nonprofit sectors.

We believe that SDSU is an excellent fit to partner with Georgian public universities and institutes in building an American university.

Established in 1897, SDSU is a high-research and large national university with extensive experience in international programs. We have study and research projects in more than 60 countries around the world, and many involve collaborations with institutions in the host countries.

SDSU graduates have traditionally supplied the largest percentage of the labor force in the San Diego region, including those working in the STEM disciplines. The San Diego region – about the size of Georgia – is among the most important in the United States and the world in the biotech and telecommunications industries. The region is very forward-looking in assuring that industrial development goes hand in hand with environmental sustainability.
SDSU graduates have an outstanding record not only as employees but also as entrepreneurs in San Diego's leading industries. SDSU has contributed significantly to the industrial and financial viability of the entire region.

We believe that our capacity in the STEM disciplines, coupled with our experience in regional development, will be strong assets in building a STEM-focused American university in Georgia.

Finally, we learned through our meetings in Georgia of the significant cultural, humanistic, environmental, and social issues that science and engineering students must be aware of in the process of national development in Georgia.

We look forward to working with MCA-Georgia to build a top-tier American university in Georgia that will be a regional hub attracting international students.

With best regards,

Elliot Hirshman
President

EH:rjl

Attachments

SAN DIEGO STATE
UNIVERSITY

Provost
5500 Campanile Drive
San Diego CA 92182 - 8010
Tel: 619-594-6881
Fax: 619-594-0178

September 23, 2013

Mr. Dimitri Kemoklidze
Procurement Director, MCA-Georgia
Millennium Challenge Account-Georgia
4, Sanapiro Street
Tbilisi 0105, Georgia

Dear Mr. Kmoklidze,

On behalf of the President, faculty, staff, and students of San Diego State University (SDSU), I am pleased to express our commitment to offering collaborative programs leading to Science, Technology, Engineering, and Mathematics (STEM) degrees in the Republic of Georgia.

SDSU is a large urban research university with 34,000 undergraduate and graduate students. The number of applicants received each year is among the highest in the United States – last year we received approximately 73,000 undergraduate applications for an entering undergraduate class of fewer than 8,000 students. Our student population is composed of 56% women and is socioeconomically and ethnically diverse, with no single ethnic majority. SDSU has high quality faculty who are focused on excellence in both teaching and research. Since 2000, we have received over $1.5 Billion in grants and contracts for innovative research and education programs. SDSU is also one of the leading producers of student Fulbright scholars in the United States and is consistently ranked as one of the top U.S. Universities for the number of students studying abroad. Our Science and Engineering programs are highly placed in national university rankings, with our Engineering programs recently recognized as having one of the highest returns on investment, e.g., earning of our graduates relative to educational cost. We strongly promote international activities, both international experiences for students and international teaching and research collaborations of our faculty.

In addition to our academic achievements, SDSU plays a central role in the economy of the San Diego region and our national economy. San Diego is an international hub of biotechnology and cybertechnology, and our regional economy is dependent upon both a constant influx of innovative ideas from academia and a highly trained STEM workforce. SDSU provides the majority of the scientists and engineers for our local industries. Our students have a strong reputation for graduating with excellent theoretical and technical skills that come from intensive classroom and hands-on laboratory training. The close relationship between SDSU and our strong local industry ensures that our students receive the best academic training to support industry needs and the continued economic development of our regional economy.

SDSU's strong tradition as an outstanding academic institution aligns closely with the qualities desired for the STEM university in the Republic of Georgia: robust undergraduate and graduate degree programs that train a wide diversity of students, a focus on collaborations with industry that promote economic development and provides high quality careers for our students, an

emphasis on entrepreneurship, international programs that expose students to different cultural and economic perspectives that are required for success in the world market, close interactions between disciplines that expose students to new interdisciplinary opportunities, and a central role in building and maintaining the STEM economy in our local region.

We are committed to developing STEM educational programs that meet the needs of the Republic of Georgia. We look forward to working with the MCA, higher education institutions, and industry in the Republic of Georgia to ensure that these programs meet the critical needs of your country.

Sincerely,

Nancy Marlin
Provost

SAN DIEGO STATE UNIVERSITY

College of Sciences
Office of the Dean
San Diego State University

December 2, 2013

Nodar Surguladze, Tertiary Education Project Director
Ketevan Tateshvili, Procurement Officer
Millennium Challenge Account-Georgia
8 Rustaveli Avenue, Block B,
Tbilisi 0114, Georgia
Tel +995 577 556195

Dear Nodar and Ketevan,

I am pleased to provide my strong support for the MCA-Georgia proposal we have titled Georgia 2020. I have been involved in this program since it was first discussed at the Association of Public and Land Grant University (APLU) event in Washington D.C., have attended all of the public meetings related to the proposal, visited the Republic of Georgia on multiple occasions, and participated in a delegation to the Republic of Georgia that included leaders in STEM disciplines from SDSU. Throughout this process, I have been enthusiastic about the potential for SDSU to collaborate on the transformation of STEM higher education in the Republic of Georgia.

Our team includes the institutional leadership of SDSU, and academic leaders in engineering and science. We have worked closely with our Georgian Partner Universities to develop the proposed plan for enhancing the capacity of Georgian to produce highly qualified STEM professionals, developing ABET-accreditation of crucial engineering and science degree programs offered at Georgian universities, and stimulating development of the STEM-related economy in the Republic of Georgia. Our proposal describes an approach to achieve these goals in a relatively rapid and sustainable fashion.

As Dean of the College of Sciences, I will play a key role in coordinating the SDSU STEM programs. I look forward to working with the MCA-Georgia and our partners in Georgian universities to make this program a success.

Thank you for all of your work on this impressive project.

Sincerely,

Stanley Maloy, Ph.D.
Dean, College of Sciences
Professor of Microbiology and Molecular Genetics

5500 Campanile Drive, San Diego, CA 92182-1010
TEL (619) 594-5142 FAX (619) 594-6381
EMAIL smaloy@sciences.sdsu.edu

Morteza Monte Mehrabadi, Ph.D.
Dean of Engineering
Professor of Mechanical Engineering
(619) 594 - 2450
(619) 594 - 3599 (FAX)
mehrabadi@mail.sdsu.edu

SAN DIEGO STATE UNIVERSITY

College of Engineering
San Diego State University
5500 Campanile Drive
San Diego, CA 92182 - 1323

December 2, 2013

Nodar Surguladze, Tertiary Education Project Director
Ketevan Tateshvili, Procurement Officer
Millennium Challenge Account-Georgia
8 Rustaveli Avenue, Block B,
Tbilisi 0114, Georgia
Tel +995 577 556195

Dear Nodar and Ketevan,

I am assuming the position as Dean of the College of Engineering on January 1, 2014, and subsequently will be closely involved with all academic programs in the college. I have been aware of the MCA-Georgia compact for nearly a year, and as Chair of the SDSU Department of Mechanical Engineering at that time I was involved in discussions about possibly including Mechanical Engineering as one of the initial degree programs to be offered in Georgia.

The leadership team involved in evaluating the priorities and developing the proposal include the Chair of Electrical and Computer Engineering and the Chair of Civil, Construction, and Environmental Engineering, as well as colleagues in the College of Sciences who work closely with the College of Engineering on academic prerequisites required for graduation. The proposed plan builds on the high quality academic programs in engineering and science at SDSU to enhance the capacity of Georgia to produce highly qualified STEM professionals, develop ABET-accredited engineering programs at Georgian universities, and provide the workforce needed to build the STEM economy in the Republic of Georgia.

As Dean of the College of Engineering, I will play a key role in working with the faculty involved in delivery of the engineering curricula. Our engineering programs are made up of dedicated faculty who value excellence in the classroom, laboratory experience that trains students in design and construction, teamwork and other skills required for success in industry, and critical thinking. The quality educational training of our graduates has made them the core of the highly skilled workforce of the San Diego technology and engineering industry, and has played a critical role in the growth of our regional economy.

I am pleased to provide my strong support for this program. I am confident that our collaboration will be successful, and will lead to productive, long-term collaborations.

Sincerely,

Monte Mehrabadi, ASME Fellow

Office of the Dean
College of Extended Studies
San Diego State University
5250 Campanile Drive
Room #2503
San Diego CA 92182 · 1923
Tel: 619 · 594 · 5822
Fax: 619 · 582 · 1622
Email: jshapiro@mail.sdsu.edu
www.neverstoplearning.net

SAN DIEGO STATE UNIVERSITY

Nodar Surguladze, Tertiary Education Project Director
Ketevan Tateshvili, Procurement Officer
Millennium Challenge Account-Georgia
8 Rustaveli Avenue, Block B,
Tbilisi 0114, Georgia
Tel +995 577 556195

Dear Nodar and Ketevan,

On behalf of the San Diego State University (SDSU) College of Extended Studies (CES), I am pleased to offer our commitment to support the Georgia 2020 Collaborative proposal submitted by San Diego State University and our key partners, Ilia State University and Tbilisi State University. As meeting workforce needs is one of the primary areas of responsibility for CES, we welcome this opportunity to make an important contribution in assisting the higher education institutions in helping expand the Republic of Georgia Science, Technology, Engineering, and Mathematics (STEM) capacity to meet evolving needs for a well-educated and well-trained STEM workforce in Georgia.

The SDSU College of Extended Studies serves approximately 27,000 enrollments a year. As a self-support operation, 100% of our funding comes from students taking classes face-to-face, in a hybrid format, and/or completely online. This self-support expertise will serve as a resource for the Georgia 2020 Collaborative in helping design, develop, and implement a portion of the proposal strategic plan for long-term sustainability. All degree programs offered by CES are staffed through academic colleges and departments to ensure that the academic quality of CES programs meet's the university's rigorous academic requirements.

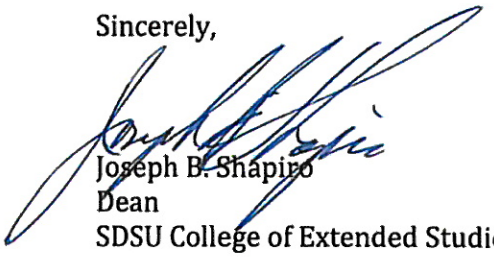
In meeting the needs of this large number of students who are college age or older, CES has created a well-developed expertise in servicing local, regional, national, and international audiences. As a result, SDSU international agreements involving credit-bearing courses that lead to degrees and certificates are generally managed through CES. Our commitment to international education has enabled us to send roughly 800 students a year to study abroad. We also bring several hundred international students to enroll in on-campus SDSU academic courses each year.

Our international focus also enables us to serve about 4,000 non-native English speakers who travel to SDSU from 50 or more countries to learn English. Students who enter these programs can start with no English language skills, can be proficient enough to study at the SDSU, or can be anywhere in between. A select group of these students are conditionally accepted to SDSU pending successful completion of English language education and training.

Familiarity working with international students, expertise in providing academic, administrative, student-support, and student-life services, will enable us to make important contributions to the successful collaboration between Ilia State University, Tbilisi State University, San Diego State University and additional potential Georgian partners who may join our initiative in the years to come.

Thank you again for the opportunity to provide information about key areas of expertise that will be available to this project through the San Diego State University College of Extended Studies.

Sincerely,



Joseph B. Shapiro
Dean
SDSU College of Extended Studies

8 Task 2 – Curriculum Plan

The partner institutions have engineering and science programs that will provide the foundation for ABET and ACS accreditation. However, to integrate the necessary changes for these programs to meet the rigorous requirements for accreditation and to meet the requirements for quality of instruction to warrant the conferring of an SDSU degree, the Georgia 2020 collaborative will use an implementation-evolution-transition process.

The core methodology of the Georgia 2020 collaborative to facilitate the accreditation of the partner institutions is to overlay SDSU's existing, and accredited, curriculum onto the strong framework already provided by the partner institution. This strategy was selected because it allows for a streamlined curricular development process, takes advantage of the existing capabilities and core competencies of the partner institutions, while also building new capacity, and leads ultimately to the implementation of a curriculum that already has accreditation, thereby reducing the risks within the assessment and accreditation process.

Responsive to the Technical Evaluation Panel comments relevant to review criterion 1, it is vital to recognize that under the preliminary ABET evaluation, two core criticisms were common throughout the Georgian degree programs targeted under Georgia 2020 for development: (1) A lack of consistent assessment of student learning; (2) A lack of sufficient General Education.

SDSU is accredited for all the proposed degrees and is an active partner with ABET and ACS (the two organizations that provide oversight for the proposed degrees) in a process of continuous improvement not only to maintain accreditation and certification, but also to improve student learning and student capacity to enter the job market in their chosen fields.

The proposed curriculum is the accredited SDSU curriculum, with no modifications. Georgia 2020 will evaluate existing courses (especially for General Education) to identify opportunities to merge the curricula of the partner institutions with an accredited curriculum. However, initially, the selected curricula have been chosen and designed to preserve all SDSU accreditations, including ABET, ACS and WASC.

In all cases, learning assessments are consistent with accreditation requirements and consist of an appropriate mix of direct and indirect assessments, with appropriate measurement tools. For example, direct assessment includes homework, examinations, class discussion and projects. Indirect Assessment includes qualitative student surveys that assist in adjusting the pace and focus of class lectures and homework, ensuring adequate progress and full compliance in learning outcomes for the students. The required culminating design experiences offered via capstone courses provide a key direct assessment opportunity at the threshold of completing the degrees. Additional direct and indirect postgraduation assessments provide a means of ensuring continued relevancy of the degree offerings to the needs of industry.

All programs at SDSU are accredited by the Western Association of Schools and Colleges (WASC). WASC is an independent 501(c)(3) non-profit U.S. corporation (http://www.wascsenior.org/). By thorough peer evaluation of curricula and policies, WASC is responsible for ensuring and improving the quality and effectiveness of over 170 colleges and universities offering the baccalaureate degree and above in California, Hawaii, Guam, the Pacific Basin, and several international locations. WASC is reviewed periodically for renewal of recognition by the U.S. Department of Education. This recognition verifies WASC to be a reliable determiner of institutional quality and integrity and thus permits accredited

institutions to apply for various forms of federal student aid. In addition, WASC is reviewed and recognized by the Council for Higher Education Accreditation.

ABET accreditation requires consideration of the programs according to several criteria, which have been specifically targeted by the proposed curricula, including:

1. Students – the qualifications of the students that are accepted and the monitoring of their performance against graduation requirements.
2. Program Educational Objectives – the mission of the program and its consistency with the institution's mission, and the achievement of these objectives. This criterion requires a working relationship with industry and an Industry Advisory Board in order to establish objectives and to assess the degree to which graduates achieve them in practice after graduation.
3. Program Outcomes – program outcomes must be established to achieve the program's educational objectives, and performance must be assessed against them. This assessment is made via metrics that are established with both direct and indirect assessments. Culminating experiences are also incorporated in the assessment strategy.
4. Continuous Improvement – Metrics must be monitored over time and used to improve the curriculum in general.
5. Curriculum – program curriculum is defined to achieve the program outcomes, and the details of this connection must be established.
6. Faculty – the, qualifications, size and the composition of the faculty to meet the needs of the curriculum.
7. Facilities – the physical resources (classrooms, labs, offices) available to support the needs of the program.
8. Support – financial resources to allow faculty development and support services of the Departments providing these programs.

Accreditation at SDSU is an institutional priority with management responsibilities falling directly with the chairs of the relevant departments, overseen by the Deans of the colleges, and ultimately the Provost of the university.

8.1 Implementation

During the initial phases of the program, the focus will be on identifying and collaborating with Georgian partner institution faculty to modify the course delivery (content, style, and assessment) to meet existing SDSU and accreditation requirements. This collaboration will be facilitated by the teaching modalities described in detail below. Selected Georgian faculty members will be hosted at SDSU to gain experience with teaching approaches used at SDSU and to integrate SDSU curricula into their own instruction. SDSU faculty will continue to co-teach courses either through in-person instruction, remote interactions, or intensive short courses until the complete collaborative faculty of both SDSU and the host institution agree the curriculum is sufficiently robust for independent ABET accreditation.

8.2 Evolution

During the Evolution phase, collaborating Georgian faculty will adopt increasing responsibility for direct implementation of the approved curriculum. During this phase, we will continue to collaborate through in-person co-teaching and online mentorship to ensure continuity with ABET/ACS approved practices,

but faculty in Georgia, who will also retain an adjunct SDSU faculty appointment, will manage the majority of the instruction.

8.3 Transition

During and after completion of the Transition phase, SDSU-hosted faculty will serve in an advisory and evaluation role as the Georgian partner institutions pursue independent ABET/ACS accreditation for the modified curricula taught directly by the Georgian institution. During this period, student cohorts will continue to receive SDSU degrees, but as the partner institutions receive accreditation the degree-awarding institution will be transitioned fully to the Georgian partner institution. During this phase, SDSU faculty will continue to advise and collaborate with Georgian faculty as needed, and will participate in long-term assessment of the program. As each program is transitioned to Georgian faculty, we will focus on the development of additional programs and partners to expand the STEM capacity in the Republic of Georgia through the 20-year MCA-Georgia contract. As noted in the Interim Proposal Technical Evaluation, the business model proposed establishes a provisional "reserve" of un-obligated funds during the transition phase. These funds, as described in detail later, will be leveraged to support the continued success of the program through four principal uses: (1) Establishment and development of new degree programs using the successful Georgia 2020 development model – disciplines to be determined in collaboration with partner institutions based on capacity and demand; (2) Construction of new facilities to allow for program expansion; (3) Maintenance of existing equipment and supplies to maintain the currency of course offerings; (4) Provide student scholarship aid to ensure long-term access for socially-disadvantaged student groups.

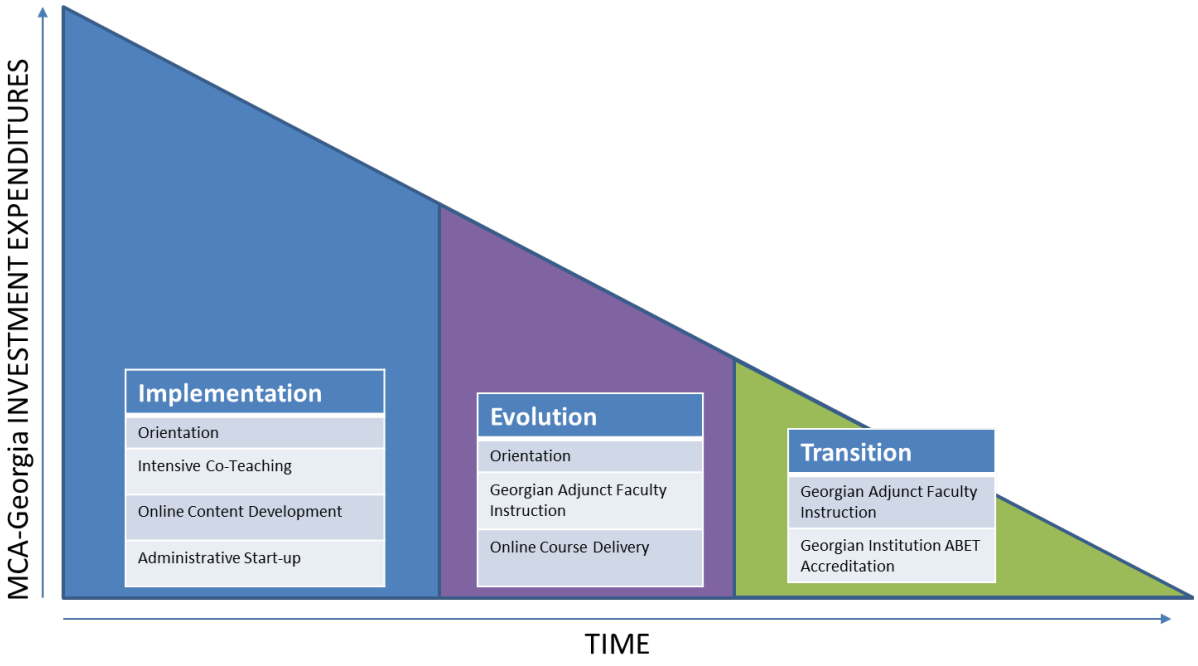


Figure 5. As the program progress, MCA Investment expenditures (primarily in capacity building) will decline, and the responsibilities of the Georgian partner institutions will take precedence.

8.4 Task 2a – Current Partner Institution Course Offerings

Partner institutions have provided their full curricula, where available, for inclusion in this narrative. Full curricula can be found in the Appendices (2-8), and are preserved for review from the Interim Proposal.

This section summarizes the state of development at the partner institutions and how these curricula will be leveraged to achieve the objectives of the program.

8.4.1 Electrical Engineering at Tbilisi State University

The ABET evaluation reported that the Tbilisi State University Electrical and Electronic Engineering degree curriculum has basic strengths and is a good candidate for development into a competitive program for ABET review. The program is abreast of current technologies, although there are opportunities to improve work involving co-design of artifacts having both hardware and software components through ongoing educational and research collaborations contemplated by Georgia 2020. The courses have expected content, and the continuous improvement processes that are in place provide a solid knowledge base. The Electrical Engineering with a Power Engineering emphasis curriculum at Georgian Technological University was recognized by the ABET evaluation committee as one of the top five programs in terms of readiness for modification and subsequent ABET review. Although the emphasis on power in this program makes it less broad than what ABET defines as basic electrical engineering, the existing professional opportunities and learning outcomes that are stated will be a basis for establishing a good set of program educational objectives and student outcomes. There appears to be good support from the dean and faculty members for addressing the needed changes, subject to the availability of adequate funding.

Table 7

INSTITUTE	Tbilisi State University
PROGRAM TITLE	Electrical Engineering – Bachelor of Science in Electrical and Electronics Engineering
PROGRAM DURATION	8 semesters – 240 ECTS credits (1 ECTS = 25 Hours)
PURPOSE/OBJECTIVE OF THE PROGRAM	Students should get general systemic idea about electrical and electronics engineering, as an applied science direction, which is based on theoretic and experimental fundamentals of natural sciences. Electrical and electronics engineering uses such knowledge and improves it via application to electronics technologies. Deep knowledge of basics of electrical and electronics engineering and application of this knowledge to practice. Knowledge of state-of-the-art of measurement and theoretic (computer simulation based) technologies. Skills of working in group projects. Knowledge and skills, necessary for professional growth. General/transfer skills. Bachelors degree students should be able to choose efficient methods of solution of stated engineering problem, to identify necessary set of measurement or computer resources and finally solve a problem.

Table 8

INSTITUTE	Georgian Technological University
PROGRAM TITLE	Electrical Engineering – Bachelor of Engineering in Electrical Engineering
PROGRAM DURATION	8 semesters – 240 ECTS credits (1 ECTS = 25 Hours)
PURPOSE/OBJECTIVE OF THE PROGRAM	Preparation of competitive staff in the field of Energy and electrical engineer which is necessary: study of the electrical energy production technologies in the Hydro and thermal power plants; Long-distance transmission of power

	from the high voltage network, its distribution among consumers, the electrical parameters of the regulatory regimes, receive required knowledge of the electrical systems. Energy installations and equipment mounting, debugging, testing, maintenance and repair skills acquisition. Studying of Ecological and economic aspects of energy, non-traditional energy sources, energy-efficient technologies and techniques to improve the reliability of the power system.

8.4.2 Chemistry with an emphasis in Biochemistry and Biotechnology at Tbilisi State University and Georgian Technological University

Chemistry programs in the U.S. are certified by the American Chemical Society (ACS). Evaluation of this program by the visiting SDSU team coupled with a thorough analysis of the courses, curricula, and facilities in Chemistry, Biochemistry, and Biotechnology at Tbilisi State University indicate that these curricula can be developed into a robust, ACS-certified degree program. Chemistry provides numerous industrial opportunities, the skills acquired in Chemistry and Biochemistry are essential for biotechnology and agricultural engineering, and chemistry is a core general education requirement for many disciplines of Engineering. In addition, the growing importance of computational chemistry (as evidenced by the recent Nobel Prize awarded in this field) provides opportunities to build a strong interdisciplinary program with Computer Science. Similar to the other programs, Tbilisi State has implemented a solid foundation for the degree and has a core of enthusiastic faculty, but the curriculum has significant gaps that impede international recognition of the degree program, and the equipment and infrastructure are inadequate for providing students with the knowledge and skills needed for the chemistry industry. Therefore, SDSU will apply the implementation-evolution-transition model to support the development of local capacity to provide internationally accredited instruction in Chemistry, Biochemistry, and Biotechnology.

Table 9

INSTITUTE	**Tbilisi State University**
PROGRAM TITLE	Chemistry
PROGRAM DURATION	8 semesters – 240 ECTS credits (1 ECTS = 25 Hours)
PURPOSE/OBJECTIVE OF THE PROGRAM	The aim of the program is to equip students with essential knowledge and skills to work effectively in the various fields of chemistry. Student outcomes include the ability to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions; the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment, and modern instrumentation; the ability to use information technology tools such as the Internet and computer-based literature searches as well as printed literature resources to locate and retrieve scientific information needed for laboratory or theoretical work; the ability to present scientific and technical information resulting from laboratory experimentation in both written and oral formats; and knowledge and understanding of the issues of safety regulations, ethics and societal issues in the use of chemicals in their laboratory work.

8.4.3 Computer Science at Tbilisi State University

The core curricula and lower-division requirements for the first two years of the Computer Science degree align sufficiently with the requirements for other degree programs to share lower division course requirements at Tbilisi State University. The evaluation of the SDSU team, supported by the ABET review team report, suggests that relatively limited modifications are needed for this program to be eligible for ABET accreditation. With additional laboratory science courses and nontechnical general education courses, the Computer Science degree will be very close to the Transition milestone. However, like the other curricula, the necessary changes will be most effectively integrated into the Computer Science degree program using an implementation-evolution-transition process. Given the favorable evaluation of Computer Science, we anticipate that the time required to reach the Transition phase may be abbreviated relative to the other programs.

Table 10

INSTITUTE	Tbilisi State University, School of Exact and Natural Sciences
PROGRAM TITLE	Computer Sciences – Bachelor of Informatics
PROGRAM DURATION	8 semesters – 240 ECTS credits (1 ECTS = 25 Hours)
PURPOSE/OBJECTIVE OF THE PROGRAM	The Aim of the bachelors degree program is to provide students with the following skills: A systematic approach to the subject; general and systematic understanding of the fundamental theoretical principles and concepts of computers and their applications; and deep understanding of the main methods in Computer Science. The alumni should apply and implement these methods in practice and skills for participation in large (Group) projects. In order to develop special skills to effectively apply theoretical knowledge in practice, it is very important for the students to have some experience of participation in real-world projects.In the light of a fast development of technologies in Computer Science, the students should be equipped with solid fundamental knowledge of the subject provide the flexibility to acquire new skills in response to new trends.

8.4.4 Microelectronics and Computer Engineering at Ilia State University

Although not as fully developed, the ABET review team reported that Microelectronics and Computer Engineering at Ilia State University has the potential to develop into a robust program. The active Robotics program at Ilia State University will provide a foundation for a degree program focused on Microelectronics. These programs will share some facilities under the Georgia 2020 resource plan (see Table 3 for summary) to leverage natural inter-disciplinary opportunities and synergies.

Ilia State has an existing program focused on Computer Engineering. The program is abreast of current trends and technologies in this discipline, has enthusiastic faculty, and recognizes the need for continuous changes in course content to respond to rapid developments in hardware and software. Although Computer Science is well developed at Tbilisi State University, Computer Engineering is not as well developed. Because the Electrical Engineering and Computer Engineering degree programs share common coursework during the first two years, the collaborative implementation period will provide appropriate structure and rigor to streamline the programs and address the concerns of the ABET review team related to structure, flexibility, and facilities. In addition, this approach will take full advantage of the core capabilities recognized by the ABET review team at both partner institutions.

Table 11

INSTITUTE	Ilia State University
PROGRAM TITLE	Microelectronics and Computer Engineering
PROGRAM DURATION	8 semesters – 240 ECTS credits (1 ECTS = 25 Hours)
PURPOSE/OBJECTIVE OF THE PROGRAM	The purpose of the Bachelor degree program in Microelectronics and Computer Engineering is to well equip students with broad and up-to-date scientific and technological knowledge and multi-skills in computer technology and microelectronics. This specialization is based on multidisciplinary teaching in different areas. Informatics: knowledge background and hands-on experience in computer and software engineering, application of its principles, methods and tools. Microelectronics: knowledge and skills in relevant methods and tools application, technical problem solving in microelectronics engineering and developing their skills in electronic equipment building from idea to prototype, knowledge in algorithm theory, object-oriented programming, creation of electronic circuits, electronic boards design, digital signal processing, microprocessors architecture and their programming, programmable logics and their programming, computer control of microelectronic devices, electric components and their working principles, connecting sensors to microprocessors, construction of robots and monitoring/measuring devices, different issues of numerical analysis.

8.4.5 Future Programs Compact Year 3 – Civil Engineering at Ilia State University

Ilia State has developed a draft curriculum for Civil Engineering that aims to teach design, planning, and improvement of the built environment. Their draft degree encompasses several sub-disciplines, including hydraulics and hydrology, structural engineering, geotechnical engineering, environmental engineering, transportation engineering and others. The existing format for this degree requires 8 semesters of instruction and ~6000 contact hours. We will leverage collaborative teaching methods to integrate existing ABET-accredited SDSU curricula with the Ilia State University curricula. Although the framework for the degree is sufficient, after careful review of the course requirements, content, and current laboratory instruction capacity, it will be more cost-effective to achieve ABET accreditation of this program and the accreditation process will be completed faster if we use a collaborative implementation-evolution-transition model.

Based upon our team's evaluation, and reinforced by the ABET review, while there is great enthusiasm for the Civil Engineering program at Ilia State University, there are substantial needs in both content and facilities to meet ABET standards. Therefore, the Georgia 2020 collaborative will leverage the existing foundation and plans to implement SDSU's ABET-accredited Civil Engineering program and effect capacity building through our articulated implementation-evolution-transition model.

Table 12

INSTITUTE	Ilia State University, School of Engineering
PROGRAM TITLE	Civil Engineering – Draft Curriculum
PROGRAM DURATION	8 semesters – 240 ECTS credits (1 ECTS = 25 Hours)
PURPOSE/OBJECTIVE OF THE PROGRAM	Civil Engineering Program aims at teaching students design, plan, and improve the built environment and infrastructures (buildings, water supply, roadways,

	pipeline, railroads and other networks, power generation facilities, pollution control works, flood protection structures, dams, and canals, airports, ports etc.). This discipline encompasses several sub-disciplines, such as: hydraulics and hydrology, structural, geotechnical, construction, environmental, civil engineering materials, transportation engineering and others. Program will also address closely related environmental issues, such as impact of human activities on the environment and vice versa (design of technologies to remove contaminants from drinking water, soils, monitor and mitigate greenhouse gas compounds, recover resources and energy from waste and design alternative energy sources, clean hazardous waste sites, mitigate and/or restore environment damaged by human activities, etc.).

8.4.6 Future Programs Compact Year 3 – Construction Engineering at Ilia State University

Based upon discussions with industry leaders and data on the development of new infrastructure throughout the Republic of Georgia, there is considerable need for graduates trained in the field of Construction Engineering. Ilia State University does not currently have a Construction Engineering degree program, although some components of this program exist in their Architecture Engineering program and draft Civil Engineering program. The Implementation strategy of Georgia 2020 will leverage the ABET-accredited curriculum of the SDSU Construction Engineering B.S. program to develop the Construction Engineering program at Ilia State University.

Table 13

INSTITUTE	Ilia State University, School of Engineering
PROGRAM TITLE	Architecture
PROGRAM DURATION	8 semesters – 240 ECTS credits (1 ECTS = 25 Hours)
PURPOSE/OBJECTIVE OF THE PROGRAM	The aim of the program is to equip students with essential knowledge and skills in the chosen field for acquiring Bachelor level architectural education. Students will obtain knowledge and skills for applying modern technologies in design and construction process, critical analysis of project and working in team of field related specialists. The programs aims at preparation of students for successful career and apart the specialized knowledge and skills equip them with transferable skills as critical thinking, original decision-making, effective communication skills in foreign language with professional and non-professionals of the field, skills of effective usage of technology.

8.5 Task 2b – Course Offerings for the Finalist Degrees

San Diego State University has a vision for an innovative degree implementation partnership that uses Academic-Industry-Government alliances to evolve existing degree programs and research training from their current state to independent, internationally-recognized, ABET/ACS-accredited degree programs that will drive economic development of STEM industries in Georgia.

Based upon input from the MCA-Georgia, Georgian universities, and Georgian industries, SDSU will initially offer four degree programs: (1) Electrical Engineering, (2) Computer Engineering, (3) Chemistry with an Emphasis in Biochemistry, and (4) Computer Science. Each of these degree programs has been mapped into a consistent curriculum to ensure maximum alignment for cohorts of students, ensuring high quality of instruction, and ensuring that the programs meet accreditation requirements.

We have developed a streamlined curriculum that allows the first two years of study to fulfill the degree requirements of multiple degrees. Unifying the first two years of courses will facilitate delivery of quality instruction, academic rigor, educational efficacy, and this cohort structure will build a cohesive student body.

The key to managing the effective establishment of Georgia 2020 will be using a model that enables the implementation of appropriate instructional methodologies, investment in facilities and equipment, and promoting outreach and recruitment strategies during the first year of the project, allowing for a seamless progression to enrollment and instruction during CY2.

A critical requirement of Georgian partner institutions to acquire ABET accreditation will be the development of curriculum and mentorship capabilities for the design elements of instruction in engineering disciplines that require these skills. ABET requirements clearly demand the development of rigorous design experiences, including a culminating design experience that mimics practice and cuts across multiple disciplines. These skills are critical aspects of the SDSU curriculum that will be implemented at partner institutions. The design experiences will incorporate realistic constraints, and include opportunities to infuse cultural and economic considerations in addition to the technical priorities. These needs are well developed in the SDSU curricula, and faculty at the partner institutions will be fully engaged in the delivery of these curricula in order to build experience in the needed levels of rigor and detail.

A summary curriculum map is provided below and detailed course descriptions for each degree program offered can be found in the Appendices (9-14).

The remainder of this page is left intentionally blank.

	Chemistry/Biochemistry - BS	ELECTRICAL ENGINEERING - BS	COMPUTER ENGINEERING - BS	COMPUTER SCIENCE - BS
General Education	*Foundations, Humanities*	*Foundations, Humanities*	*Foundations, Humanities*	*Foundations, Humanities*
	CON E 101	CON E 101	CON E 101	CON E 101
	PHIL 101	PHIL 101	PHIL 101	PHIL 101
	2 more from lit, hist, foreign language	1 more from lit, hist, foreign language	1 more from lit, hist, foreign language	1 more from lit, hist, foreign language
	CAN get these from their classes	CAN get these from their classes	CAN get these from their classes	CAN get these from their classes
	American Institutions: Poli Sci 101/102	*American Institutions*: Poli Sci 101/102	*American Institutions*: Poli Sci 101/102	*American Institutions*: Poli Sci 101/102
	Social Behavioral: ECON 102	*Social Behavioral:* ECON 102	*Social Behavioral:* ECON 102	*Social Behavioral:* ECON 102
	Explorations	*Explorations*	*Explorations*	*Explorations*
	Phil 332	Phil 332	Phil 332	Phil 332
	ISCOR 301 (Social/Behavioral)	ISCOR 301 (Social/Behavioral)	ISCOR 301 (Social/Behavioral)	ISCOR 301 (Social/Behavioral)
	Upper Div from their classes, cultural diversity	Upper Div from their classes, cultural diversity	Upper Div from their classes, cultural diversity	Upper Div from their classes, cultural diversity
Prep Program	**Prep Program - Semester 1**	**Prep Program - Semester 1**	**Prep Program - Semester 1**	**Prep Program - Semester 1**
	English Academy - 1	English Academy - 1	English Academy - 1	English Academy - 1
	STEM Prep - 1	STEM Prep - 1	STEM Prep - 1	STEM Prep - 1
	Prep Program - Semester 2	**Prep Program - Semester 2**	**Prep Program - Semester 2**	**Prep Program - Semester 2**
	English Academy - 2	English Academy - 2	English Academy - 2	English Academy - 2
	STEM Prep - 2	STEM Prep - 2	STEM Prep - 2	STEM Prep - 2
	Semester 1 (4 courses 15 credits)	**Semester 1 (4 courses 13 credits**	**Semester 1 (4 courses 13 credits)**	**Semester 1 (5 courses 16 credits)**
	GE Composition (3)	GE Composition (3)	GE Composition (3)	GE Composition (3)
	MATH 150 (4)	MATH 150 (4)	MATH 150 (4)	MATH 150 (4)
	CHEM 200 (5) incl 3-hr Lab)	BIOL 100 (3)	BIOL 100 (3)	BIOL 100 (3)
	GE Social and Behavioral Science (Humanities)	GE Social and Behavioral Science (3)	GE Social and Behavioral Science (3)	GE Social and Behavioral Science (3)
			***	CS 107 (3)
	Semester 2 (4 courses 15 credits)	**Semester 2 (5 courses 14 credits)**	**Semester 2 (6 courses 17 credits)**	**Semester 2 (6 courses 17 credits)**
	GE Intermediate Composition (3)	GE Intermediate Composition (3)	GE Intermediate Composition (3)	GE Intermediate Composition (3)
	GE Oral Communication (3)	GE Oral Communication (3)	GE Oral Communication (3)	GE Oral Communication (3)
	MATH 151 (4)	MATH 151 (4)	MATH 151 (4)	MATH 151 (4)
	!Is there a reason that PHYS 195 could not	PHYS 195 (3)	PHYS 195 (3)	PHYS 195 (3)
	be moved here in parallel with other majors?]	PHYS 195L (1)	PHYS 195L (1)	PHYS 195L (1)
	CHEM 201 (5) incl 3-hr Lab		MATH 245 (3)	CS 108 (3)
	Summer (2 courses 6 credits)	**Summer (2 courses 6 credits)**	**Summer (2 courses 6 credits)**	**Summer (2 courses 6 credits)**
	American Institutions (3)	American Institutions (3)	American Institutions (3)	American Institutions (3)
	GE Humanities (3)	GE Humanities (3)	GE Humanities (3)	GE Humanities (3)
	Semester 3 (5 courses 14 credits + 1 Elective)	**Semester 3 (6 courses 17 credits)**	**Semester 3 (5 courses 13 credits)**	**Semester 3 (3 courses 9 credits)**
	GE Humanities (3)	MATH 254 (3)	MATH 254 (3)	MATH 254 (3)
	GE Social and Behavioral Science (3)	MATH 252 (4)	PHYS 196 (3)	CS 237 (3)
	Math 252 Major Prep (4)	PHYS 196 (3)	PHYS 196L (1)	STAT 250 (3)
	Phys 195 Major Prep (3)	PHYS 196L (1)		
		COMPE 160 (3) incl 3-hr Lab		
		COMPE 270 (3)	COMPE 270 (3)	
	Semester 4 (8 classes 22 credits)	**Semester 4 (5 courses 15 credits)**	**Semester 4 (6 courses 18 credits)**	**Semester 4 (3 plus courses 9 plus credits)**
	Writing Placement Assessment Exam	Writing Placement Assessment Exam	Writing Placement Assessment Exam	Writing Placement Assessment Exam
	GE Humanities (3)	GE Humanities (3)	GE Humanities (3)	GE Humanities (3)
	GE Social and Behavioral Science (3)	GE Social and Behavioral Science (3)	GE Social and Behavioral Science (3)	GE Social and Behavioral Science (3)
	GE Life Science (3)			Major Prep: 2nd Sequence of Physical or Life Science with Lab**
			COMPE 260 (3)	
	Phys 196 Major Prep (3)	A E 280 (3)	A E 280 (3)	MATH 245 (3)
	Phys 196L Major Prep (1)	E E 210 (3)	EE 210 (3)	
	Chem 232 Major Prep (3)			
	Chem232L Major Prep (1)	COMPE 271 (3)	COMPE 271 (3)	
	Chem 251 Major Prep (5) incl 6-hr Lab			
	Summer	**Summer**	**Summer**	**Summer**
	GE Explorations			
	Semester 5 (5 courses 14 credits plus Elective)	**Semester 5 (5 courses 13 credits)**	**Semester 5 (5 courses 15 credits)**	**Semester 5 (4 courses 6 plus credits)**
	WPA score could require either RWS 280 or 281 and an approved Upper Division Writing Course	WPA score could require either RWS 280 or 281 and an approved Upper Division Writing Course	WPA score could require either RWS 280 or 281 and an approved Upper Division Writing Course	WPA score could require either RWS 280 or 281 and an approved Upper Division Writing Course
	GE Humanities (3)	COMPE 375 (3) incl 3-hr Lab	COMPE 375 (3) incl 3-hr Lab	CS 310 (3)
	Chem 410A Major (4) incl 3-hr Lab	E E 300 (3)	E E 300 (3)	
	Chem 432 Major (3)	E E 310 (3)	E E 310 (3)	
	Chem 432L Major (1)	E E 330 (3)		CS 370 (3)
	Chem 560 Major (3)	E E 330L (1) 3-hr Lab	COMPE 361 (3)	Major Elective: MATH/STAT*
	Elective (1)			Additional Approved Science**
			COMPE 470 (3)	
	Semester 6 (5 courses 14 credits plus Elective)	**Semester 6 (4 courses 12 credits)**	**Semester 6 4 courses 10 credits)**	**Semester 6 (4 courses 6 plus credits)**
	GE Social and Behavioral Science (3)			
	GE Humanities (3)	E E 340 (3)	E E 330 (3)	CS 320 (3)
	Chem 410B Major (3)	E E 380 (3)	E E 330L (1) 3-hr Lab	CS 530 (3)
	Chem 417 Major (2) - 6-hr Lab	E E 410 (3)	COMPE 475 (3)	Major Elective: CS*
	Chem 567 Major (3) incl 6-hr Lab	E E 430 (3)	E E 410 (3)	Additional Approved Science
	Elective (1)			
	Summer	Summer	**Summer**	**Summer**
		ISCOR 301	ISCOR 301	
	Semester 7 (6+ courses 15+ credits)	**Semester 7 (4 courses 12 credits + 2 Electives)**	**Semester 7 (2 courses 6 credits + 2 Electives)**	**Semester 7 (4 courses 10 credidts plus Elective)**
	GE American Institutions (3)	GE Explorations: Humanities**	GE Explorations: Humanities**	GE Explorations: Humanities**
	GE Explorations (3)	E E 420 (3)		CS 440 (3)
	Chem 457 Major (2) - 6-hr Lab	E E 434 (3)		CS 490 (1)
	Chem 520A Major (3)	E E 440 (3)	COMPE 560 (3)	CS 560 (3)
	Chem 550 Major (2)	Major Elective w/ Lab	Major: Mathematics Elective	Major Elective: CS*
	Chem 563 Major (2)	Major Elective	Major: Engineering Electives	
	CHEM 563 (2)			
	Semester 8 (7 courses 15-17 credits)	**Semester 8 (2 courses 7 credits + 2 Electives)**	**Semester 8 (2 courses 7 credits plus Elective)**	**Semester 8 (2 courses 6 credits + 3 Electives)**
	GE Explorations: Upper Div Am Institutions* (3)	GE Explorations: Social Behavioral Sciences	GE Explorations: Social Behavioral Sciences	GE Explorations: Social Behavioral Sciences
	GE Explorations (3)	Major Elective		CS 570 (3)
	Chem 520B Major (3)	Major Elective w/ Lab	Major: Technical Elective	Major Elective: CS*
	Chem 427 Major (1) - 3-hr Lab	E E 490 (4) incl 6-hr Lab	COMPE 490 (4) Incl 6-hr Lab	Major Elective: CS*
	Chem 562 Major (2)			Elective
	Chem 564 Major (2)			
	Chem 498 Major (1-3)			

8.6 Task 2c – Process for Adaptation

For all Implementation processes, a common strategy will be employed. In summary, the first degree years will be aligned according to the required prerequisites as outlined above. The common General Education and lower-division requirements streamline the delivery, and the majority of courses can be rapidly deployed by a combination of online course delivery, alignment with existing courses at partner institutions, and appropriate collaborative co-teaching with existing Georgian faculty, who will be appointed as adjunct SDSU faculty to deliver curricula consistent with SDSU degree requirements.

This methodology further facilitates rapid launch of the program as many of the resources to provide General Education and lower-division courses are already sufficiently in place to begin instruction with minimal coordination between existing SDSU, and additional Georgian-SDSU faculty. During this quick-start period, requirements for upper-division courses – infrastructure, laboratories, safety procedures, and requirements for long-term sustainability, including administrative offices, recruitment, and outreach, will be put in place with a measured approach.

The program is designed to accelerate qualified students directly into Semester 1, anticipating completion of an SDSU degree in 4 years. However, responsive to the program objective to facilitate access and capacity building for socially-disadvantaged groups in Georgia, an optional preparatory year may be implemented if need is found to be great. For example, socially disadvantaged students may meet all requirements for admission except for sufficient English preparation. In that case, English language preparatory programs may be made available, as described in greater detail in the appropriate task below.

The Georgian partner institutions have established a viable academic framework and infrastructure to provide rigorous instruction appropriate for ABET or ACS accreditation. However, to meet the requirements for quality of instruction to warrant the conferring of an SDSU degree, the Georgia 2020 collaborative will use the implementation-evolution-transition process.

During the initial phases of the program, the focus will be on identifying and collaborating with Georgian partner institution faculty who may be interested in modifying their course delivery (content, style, and assessment) to match existing SDSU requirements. This collaboration will be facilitated by the teaching modalities described in detail below. In summary, Georgian faculty will be hosted at SDSU to observe and integrate SDSU curricula and assessment strategies in their own instruction. SDSU faculty will continue to co-teach courses either through remote interactions, intensive instruction periods, or in-country instruction until the complete collaborative faculty of both SDSU and the host institution agree the curriculum is sufficiently robust for independent ABET/ACS accreditation.

During the evolution phase, collaborating Georgian faculty will assume increasing responsibility for direct implementation of the approved curriculum. During this phase, there may continue to be limited collaboration through in-person co-teaching, or occasional virtual office hours to ensure continuity with ABET/ACS-approved practices, but faculty in Georgia, who will also retain an adjunct SDSU faculty appointment, will manage the majority of the instruction.

Through completion of the Transition phase, SDSU-hosted faculty will serve an advisory role as the Georgian partner institutions pursue independent accreditation for the modified curricula to be provided directly at the Georgian institution. During this period, cohort students will continue to receive SDSU degrees, but at some point during the program period, the degree-awarding institution will either

become a joint-venture, or will be transitioned fully to the Georgian institution upon receipt of ABET or ACS accreditation. As each program transitions to the Georgian partner institution, we will focus on development of additional programs and expanding highly desirable programs to other partner institutions.

8.6.1 Adapted Curriculum – Electrical and Computer Engineering

For the Computer and Electrical Engineering degrees the first two years of instruction have been streamlined and coordinated to present a unified, ABET-accredited curriculum that leverages existing core competencies to be supported at all three partner institutions. These courses will largely be delivered via appropriate Georgian faculty that will have participated in a collaborative educational experience at SDSU, and will provide instruction as faculty appointed at the partner institutions and adjunct faculty at SDSU, approved online courses already offered at SDSU with appropriately trained lecturers and/or teaching assistants available at the host institution, or resident faculty deployed from SDSU to implement the courses collaboratively with host faculty. As an example, required summer courses that maintain appropriate progress to the degree, are already offered as online courses in SDSU's accredited programs. This facilitates efficient progress for the students, maintains cohesion within each student cohort, and allows accredited instructional delivery in a cost-effective manner.

Where the curricula diverge, the difference in required coursework is minimal, typically a single course in a given semester, allowing students to take classes aligned with other programs at their institution, and ensuring efficient delivery and sequencing of degree-specific courses. As part of the program design strategy, courses specific to a degree (e.g., Math 252) may be priority targets to rapidly Evolve-Transition to host-institution instruction only, or to be converted to online instruction when appropriate.

Students choose their degree program after the completion of their third semester, in preparation for their specialization in upper-division courses. These courses, requiring a high intensity of instruction, laboratory infrastructure and maintenance, safety practices, and instructor expertise will be offered predominantly through instructional strategies consisting of collaboratively engaged Georgian faculty with adjunct appointments, and SDSU faculty teaching in a hybrid format that includes intensive short courses (2-4 weeks) delivered in-person followed by interactive online lectures through the rest of the semester, and potentially culminating the course with additional intensive, face-to-face lectures prior to the end of the semester.

As an added option to the Electrical Engineering program, a concentration in Power Engineering will be offered in collaboration with the experienced faculty at Georgian Technological University. This disciplinary specialization expands the reach of Georgia 2020 by explicitly including GTU students and meets a demonstration market need for improved expertise in power generation and transmission in the Republic of Georgia. Because this concentration requires limited additional course-work and minimal specialized laboratories it can be included at low cost for high impact.

Course offering by semester								
Target	**Electrical Engineering = 60**		**Computer Engineering = 60**					
	Main campus	**Mode of instruction**	**Support Campus**	**EE**	**Computer E**			
Semester 3								
CompE 160	ISU,TSU,or GTU	Collaborative	SDSU	x	x			
CompE 270	ISU,TSU,or	Collaborative	SDSU	x	x			

	GTU							
Semester 4								
AE 280	ISU,TSU,or GTU	Collaborative	SDSU	x	x			
EE 210	SDSU	online	ISU,TSU,or GTU	x	x	Lab is managed by ISU		
CompE 271	SDSU	online	ISU,TSU,or GTU	x	x			
CompE 260	SDSU	online	ISU,TSU,or GTU		x			
Semester 5								
EE 300	ISU,TSU,or GTU	Collaborative	SDSU	x	x			
EE 310	SDSU	online	ISU,TSU,or GTU	x	x			
EE 330	SDSU	Hybrid	ISU,TSU,or GTU	x	x			
EE 330 Lab	ISU,TSU,or GTU	Cooperative	SDSU	x	x			
CompE 375	SDSU	Hybrid	ISU,TSU,or GTU	x	x	Lab is managed by ISU		
Semester 6								
EE 340	SDSU	Hybrid	ISU,TSU,or GTU	x				
EE 380	SDSU	online	ISU,TSU,or GTU	x				
EE 410	SDSU	Hybrid	ISU,TSU,or GTU	x	x			
CompE 361	SDSU	online	ISU,TSU,or GTU		x			
CompE 470	SDSU	Hybrid	ISU,TSU,or GTU	x	x (req)	Elective for Electrical Engineering		
CompE 560	SDSU	online	ISU,TSU,or GTU		x			
Semester 7								
EE 420	SDSU	online	ISU,TSU,or GTU	x (Req)	x	Elective for computer engineering		
EE458	SDSU	online	ISU,TSU,or GTU	x (Req)	x	Elective for computer engineering		
EE 440	SDSU	online	ISU,TSU,or GTU	x (Req)				
EE 430	SDSU	online	ISU,TSU,or GTU	x (Req)				
CompE 470L	ISU,TSU,or GTU	Hybrid	SDSU	x (Elective)	x (Req)			
Math elective	ISU,TSU,or GTU	Collaborative	SDSU		x	Elective for computer engineering		
Semester 8								
EE 558	SDSU	online	ISU,TSU,or GTU	x				

EE 558 L	ISU,TSU,or GTU	Cooperative	SDSU	x				
EE 556	SDSU	online	ISU,TSU,or GTU	x	x			
EE 430 Lab	ISU,TSU,or GTU	Cooperative	SDSU	x				
CompE 572	SDSU	Hybrid	ISU,TSU,or GTU	x	x			
CompE 565	SDSU	online	ISU,TSU,or GTU		x			
CompE 475	SDSU	Hybrid	ISU,TSU,or GTU		x			
Semester 9								
Senior Project	ISU,TSU,or GTU	online	SDSU	x	x			

8.6.2 Adapted Curriculum – Chemistry with an emphasis in Biochemistry

Chemistry will be delivered at Tbilisi State University for a number of strategically important reasons. Chief among them are the appropriate facilities and faculty for refurbishment, construction, and management of sophisticated chemistry laboratories required for a modern, internationally recognized Chemistry degree.

The Department of Chemistry and Biochemistry at SDSU offers the required classroom instruction to provide undergraduate students with a solid knowledge base in the major disciplines in chemistry, but the hallmark of the program has always been and continues to be a strong laboratory component, featuring the direct involvement of full-time faculty in teaching advanced lab courses, and a very active undergraduate research program. The B.S. Degree in Chemistry at SDSU is certified by the American Chemical Society (ACS), which is the major accrediting agency for chemistry programs in the U.S. The ACS conducts a comprehensive review of the programs every 5 years, and requires annual program updates. The last comprehensive review was conducted in 2010, and there were no concerns with the programs at that time. The next comprehensive review is expected in 2015.

To ensure that entering students have sufficient background to be a success in General Chemistry, prior to enrolling in Chem 200, students must pass this per-200 exam or pass Chem 100, a lower-level preparatory class, with a C grade or better.

Undergraduate research plays an important role in all SDSU degree programs. At least 1 unit of research is a required component of the Chemistry degree program, but most of the students do substantially more. Undergraduates work closely with faculty members, and are fully integrated into their research groups. Most faculty members have several undergraduates in their research group at a time, giving students a wide variety of different research opportunities, and providing them with invaluable, practical hands-on experience.

Proposed Biochem, Chem, Biotech Course Offerings and Instructors for SDSU-Georgia					
Updated 2/2/14					
	Location	**Faculty**	**Mode of Instruction**	**Support Campus**	**Lab Building Control**

Semester 1					
Chem 100 (3 lec), Remedial	TSU,GTU,ISU	All Georgian Faculty	Collaborative	TSU,GTU,ISU	
Chem 100 (1 lab), Remedial	TSU,GTU,ISU	All Georgian Faculty	Collaborative	TSU,GTU,ISU	
For students who fail C200 pre-test					
Semester 2					
Chem 200 (3 lec)	TSU	Hybrid SDSU Fac & SDSU Trained Fac	Online Sync/Cooperative	TSU	
Chem 200 (2 lab)	TSU	SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Semester 3					
Chem 201 (3 lec)	TSU	Hybrid SDSU Fac & SDSU Trained Fac	Online Sync/Coopeartive	TSU	
Chem 201 (2 lab)	TSU	SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Semester 4					
Chem 232 (3 lec)	TSU	Hybrid SDSU Fac & SDSU Trained Fac	Online Sync/Cooperative	TSU	
Chem 232Lab (1 lab)	TSU	SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Chem 251 (3 lec)	TSU	Hybrid SDSU Fac & SDSU Trained Fac	Online Sync/Cooperative	TSU	
Chem 251 (2 lab)	TSU	SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Semester 5					
Chem 410A (3 lec)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	
Chem 410A (1 lab)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Chem 432 (3 lec)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	
Chem 432Lab (1 lab)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Chem 560 (3 lec)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	SDSU Control
Semester 6					
Chem 410B (3 lec)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	
Chem 417Lab (2 lab)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Chem 567 (1 lec)	GTU, TSU	SDSU Fac or SDSU Trained Fac	Cooperative	GTU, TSU	SDSU Control
Chem 567 (2 lab)	GTU, TSU	SDSU Fac or SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Semester 7					
Chem 457 Lab (2	TSU	SDSU Fac or SDSU	Cooperative	SDSU	SDSU

lab)		Trained Fac			Control
Chem 520A (3 lec)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	
Chem 550 (2 lec)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	
Chem 563 (2 lec)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	
Semester 8					
Chem 427 Lab (1 lab)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	SDSU	SDSU Control
Chem 562 or 564 (2 lec)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	
Major Electives (4 lec or 4 lab)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	TSU	
Chem 498 (1 unit, senior project)	TSU	SDSU Fac or SDSU Trained Fac	Cooperative	SDSU	SDSU Control

8.6.3 Adapted Curriculum – Computer Science

Computer Science at Tbilisi State University was recognized by the ABET evaluators as being one of the programs most developed for accreditation. Georgia 2020 will take full advantage of the existing program to accelerate development and accreditation by aligning General Education requirements with the Chemistry degree planned at Tbilisi State University. Although some course divergence does occur early in the lower-division curricula, overall, the curricula are strategically positioned to take advantage of the other SDSU degree requirements. For example, during Semester 2, Chem 200 is required for Chemistry majors, but not for Computer Science majors. While the Chemistry students focus on their initial laboratory intensive training, Computer Science students will have access to their basic science general education requirement by taking Biol 100 online or a comparable course currently offered at Tbilisi State University. Other curricular divergences have been positioned to have similarly articulated solutions.

8.6.4 Future Program Compact Year 3 – Adapted Curriculum – Civil Engineering and Construction Engineering

Civil Engineering and Construction Engineering degree programs will be delivered at Ilia State University, building upon the foundation of the Architectural Engineering and Geoengineering expertise at this institution. The SDSU Civil and Construction Engineering curricula are based upon intensive practical experience, collaboration with industry, and a robust capstone design experience. A full course-by-course list of classes and proposed teaching modalities is outlined below.

The requirements for Civil and Construction Engineering have been streamlined and unified to the extent possible, while still retaining required rigor and subject matter. The curriculum for Civil Engineering and Construction Engineering diverge substantially in Semester 3, requiring students to "declare" their degree program after the completion of their second semester. While students are completing the unified lower-division coursework, we will focus on acquiring appropriate facilities, developing collaboratively approved and accredited courses, identifying appropriate host institution faculty, and establishing appropriate teaching modalities for the advanced courses.

From Semester 4 through completion of the degree, elements of the Civil and Construction Engineering degree requirements diverge substantially, requiring appropriate subject-matter expertise to maintain

the rigor of the program. As with the other programs, the Finalist and partner institutions will be working collaboratively to prepare appropriate teaching modalities for upper-division courses, including building cooperative teaching methods, and identifying and engaging with host faculty to deliver on-site instruction in parallel with accredited instruction during the first three semesters.

Course offering by semester								
	Main campus	**Mode of instruction**	**Support Campus**	**CivE Program**	**ConE Program**	**Notes**		
Semester 1								
CIV E 100	ISU	Collaborative	SDSU	x				
Semester 3								
STAT 250	ISU	Collaborative	SDSU	x	x			
ME/AE 200	ISU	Collaborative	SDSU	x	x			
CIV E 220	ISU	Collaborative	SDSU	x	x			
CON E 101 (hum)	ISU	Collaborative	SDSU	x	x			
CON E 201	ISU	Collaborative	SDSU		x			
Semester 4								
AE 280	ISU	Collaborative	SDSU	x				
AE/ME 220	ISU	Collaborative	SDSU	x				
CIV E 218	ISU	Collaborative	SDSU	x	x	Lab is managed by ISU		
CON E 280	ISU	Hybrid	ISU		x			
GEOL 100	SDSU	on-line	ISU		x			
GEOL 101	ISU	Collaborative	SDSU		x	Lab is managed by ISU		
Semester 5								
CIV E 301	SDSU	on-line	ISU	x	x			
CIV E 302	ISU	Collaborative	SDSU	x	x	Lab is managed by ISU		
CON E 430	SDSU	on-line	ISU	x	x			
AE 340	SDSU	on-line	ISU	x				
ME 350	SDSU	on-line	ISU	x				
CON E 301	SDSU	on-line	ISU		x			
CON E 310	SDSU	Hybrid	ISU		x			
CON E 312	SDSU	on-line	ISU		x			
Semester 6								
CIV E 321	SDSU	Hybrid	ISU	x	x			
CIV E 481	SDSU	Hybrid	ISU	x				
ENV E 355	SDSU	on-line	TSU	x				
CON E 320	SDSU	on-line	ISU		x			
Semester 7								
CIV E 421	SDSU	Hybrid	ISU	x	(poss elec)	CON E needs ONE TOTAL elec		

CIV E 444	SDSU	on-line	ISU	x		Lab is managed by ISU		
CIV E 462	SDSU	on-line	ISU	x	x			
CIV E 463	SDSU	Cooperative	ISU	x	x	Lab is managed by ISU		
CON E 401	SDSU	on-line	ISU	(poss elec)	x	Lab is managed by ISU		
CIV E tech elec	SDSU	on-line	ISU	x	(poss elec)	CON E needs ONE TOTAL elec		
Semester 8								
CIVE 495	SDSU/ISU	Hybrid	SDSU	x	x			
CIV E tech elec	SDSU	on-line	ISU	x	(poss elec)	CON E needs ONE TOTAL elec		
CIV E tech elec	SDSU	on-line	ISU	x	(poss elec)	CON E needs ONE TOTAL elec		
CIV E tech elec	SDSU	on-line	ISU	x	(poss elec)	CON E needs ONE TOTAL elec		
CIV E tech elec	SDSU	on-line	ISU	x	(poss elec)	CON E needs ONE TOTAL elec		
CON E 479	SDSU	on-line	ISU	(poss elec)	x	Lab is managed by ISU		
CON E 480	SDSU	on-line	ISU	(poss elec)	x			
CON E 490	SDSU	Hybrid	ISU		x			

8.7 Task 2d – Mix of Instructional Techniques

The Georgia 2020 collaborative will implement four specific instructional modalities that strive to balance in-person faculty-led instruction with hybrid and online courses.

SDSU has extensive experience in implementing and leveraging quantifiable educational outcomes from all four modalities (described in detail below). In all cases, assessments are consistent with accreditation requirements and consist of an appropriate mix of direct and indirect assessments, with appropriate measurement tools. For example, direct assessment includes homework, examinations, class discussion and projects. Indirect Assessment includes qualitative student surveys that assist in adjusting the pace and focus of class lectures and homework, ensuring adequate progress and full compliance in learning outcomes for the students. The culminating design experiences offered via capstone courses provide a key direct assessment opportunity at the threshold of completing the degrees. Additional direct and indirect post-graduation assessments provide a means of ensuring continued relevancy of the degree offerings to the needs of industry.

After detailed review of existing Partner Institution curricula and the current resources and capabilities of SDSU faculty, each course has been assigned a priority instructional modality. Different modalities have different costs associated with them; however, all are structured to evolve into ABET/ACS-accredited courses taught independently by partner institution faculty. For budget purposes, the more than 70 unique courses proposed for 6 degree programs have been organized into one of the preferred teaching modalities. Whenever possible, modalities that leverage the existing infrastructure and

experience of partner institution faculty will be used to accelerate the implementation-evolution-transition process and facilitate the transfer of instruction to Georgian faculty. As each program is transitioned to the Georgian faculty, we will focus on development of additional STEM bachelors degree programs in areas of high need for the Republic of Georgia.

All modalities are designed to build capacity at the host institution through direct and intensive faculty collaboration. As agreed by the partner institutions and SDSU, the course content and instructional responsibilities will be transitioned to the host institution when long-term instruction rigor, safety, consistency, assessment and outcomes have been achieved.

8.7.1 Modality 1 – Collaborative Teaching

Where possible, we will appoint qualified faculty members at the partner institution as adjunct faculty at SDSU. This will initially be applied to General Education and lower-division courses. However, as the program develops this modality will also be used to secure final transition under the capacity building objectives of the project.

We plan to develop ongoing collegial interactions between faculty based at SDSU and faculty based at the partner institutions. The kick-start for the ongoing collaboration will be an introduction to SDSU, the campus, campus policies and practices, and a team-teaching opportunity to orient the Georgian faculty to ABET/ACS-accredited practices in place at the SDSU campus in San Diego.

Immediately upon award of the contract, SDSU will invite Georgian faculty to SDSU to observe and collaborate on course delivery, laboratory safety and delivery, and curriculum development, and to discuss any adjustments needed for the Georgian student population. The Georgian faculty will be hosted at SDSU over a six-week summer session or an academic semester. During their time on the SDSU campus, Georgian partner institution faculty will also be able to meet with leaders of the San Diego biotechnology, cybertechnology, and other industries as well as participate in our entrepreneurship program. When not working on these training goals, the visiting faculty can experience other aspects of the SDSU campus and San Diego environment, including student-life activities such as presentations, conferences, seminars, concerts and art events on campus, study in the SDSU library, enjoy team sports, use of the Aztec Recreation Center and the three swimming pools.

Upon completion of this first phase of collaborative development, the partner institution faculty member will return to his or her host institution with a second appointment as an adjunct SDSU faculty member, representing SDSU as a professor or lecturer. This instructor will proceed to implement the agreed curriculum in their discipline of expertise with weekly contact/guest lecture facilitated between the Partner Institution faculty, students, and SDSU collaborating faculty member, or more frequently as needed.

8.7.2 Modality 2 – Cooperative Teaching

For certain General Education courses, particularly in Social Sciences and Humanities, it may be most efficient to begin the transfer of capacity by having American trained instructors participate fully in the launch of the course curricula in Georgia. Under this modality, existing SDSU faculty/lecturers will travel and stay at the host institution for 1-3 academic semesters working closely with host institution faculty to effect appropriate policies and practices that will ensure course quality and rigor when instructional responsibilities are passed on to the host institution faculty. Other courses where this modality will be critical include advanced upper-division courses where there are requirements for the operation of sophisticated and/or sensitive instrumentation, or specific laboratory experiences that may not be as common in the host institution curriculum or culture.

8.7.3 Modality 3 – Online Delivery

Online courses are designed and delivered appropriately to ensure that they are most effective. Such online delivery methods will be primarily used to meet General Education requirements. A typical course will include lecture modules, synchronous and asynchronous, reading and video assignments, and online exercises. Consistent with accreditation practices, students will interact with each other online, but also in appropriately scheduled Face-to-Face study sections moderated by a host institution lecturer or teaching assistant. These courses also include opportunities for online meetings in which the professor will answer questions posed by the students.

8.7.4 Modality 4 – Hybrid Delivery

Electrical Engineering has experience with an existing successful program providing advanced engineering education in India. This approach involves a two-week period of intensive face-to-face instruction at the beginning of the course, with subsequent instruction consisting of distance lecture each week with support from a host institution Lecturer or Teaching Assistant. This hybrid delivery modality is scripted in great detail to ensure instruction hours and learning outcomes consistent with the accreditation requirements of SDSU. During the in-person instruction, class periods incorporate 150 minutes of lecture per day, four days a week. In some cases, this may be followed by additional intensive in-person instruction prior to the end of the course.

8.7.5 On-Line and Hybrid Course Management

In Response to Technical Evaluation Panel Comments relevant to review criterion 2: Online course management presents a potential challenge in direct delivery at times appropriate to both Georgia and San Diego, accommodating students and faculty from both geographies. As indicated by the Technical Review Panel, certain asynchronous exercises would mitigate the 12-hour time difference, and we will use this approach when pedagogically appropriate for student learning and access. However, the objective of Georgia 2020 is to provide as common an educational experience as possible, and that means access to lectures and faculty in real-time. During the planning process, the management teams from SDSU and the Georgian partner institutions have coordinated regularly in real-time via Skype and other virtual meeting platforms. In fact, the morning hours in San Diego correspond directly to the early evening and evening hours in Georgia. Accounting for cultural norms in Georgia that generalize to a later active period, SDSU courses that launch at 8:00 AM or 9:00 AM will be easily subscribed in Georgia at 20:00 and 21:00 respectively. Conversely, SDSU commonly launches courses that begin at 2000, 2100 or later depending on the enrollment, and these times would correspond to 0800, 0900 or 1000 in Tbilisi. Earlier morning classes may be culturally challenging for new students, but course time requirements will fall within the normal course of international business expectations. In fact, the planning and development process for Georgia 2020 serves as a real-world demonstration for the capability of SDSU and the partner institutions to collaborate both in synchronous (e.g., SKYPE, face-to-face, and intensive short-courses) and asynchronous (e.g., archived lectures, online posting, etc.) modes.

8.7.6 Class Sizes

While some of the introductory courses in the majors and the general education requirements may be large, the upper-division courses in the majors will be relatively small. At leading American universities, as is the case at SDSU, introductory courses may have an enrollment of 500 or more students, with regular faculty conducting the lectures, and TAs leading the discussion as well as laboratory sections. We anticipate that the upper-division major courses, taught by faculty, will enroll between 20 to 50 students, depending on the subject matter.

Class sizes will depend on the subject matter and optimal teaching modality. In general, the student-to-teacher ratio will be approximately 20-30:1. However, some modalities require a substantially greater

student-to-teacher ratio during lecture instruction, while planning for more personalized access during laboratory, discussion or study sections. Because the Georgia 2020 collaborative utilizes existing ABET-accredited policies and processed at SDSU, those same practices will be translated within the collaborative teaching model described. For faculty budget purposes, all classes were capped at 60 students for in-person, hybrid, and online courses, 25 for laboratory courses and General Education English instruction courses, and 20 for advanced Chemistry laboratory courses.

Responsive to the Technical Evaluation Panel comment relevant to criterion 4, we further outline the faculty staffing plan below.

The details of the faculty staffing plan are embedded in the budget worksheets, particularly the FACULTY/STAFF sheet. However, here some basic premises will be outlined that will serve as justification for the proposed staffing levels, and the attendant salary and fringe costs.

First, Georgian Faculty/Staff are defined as any resident, qualified instructor capable of securing an affiliation with one of the partner institutions. At the heart of the program will be existing qualified faculty, but this cohort may be expanded to include ex-patriot Georgians living in the United States that may have sufficient training and desire to repatriate to Georgian and serve on the faculty. SDSU/Host Campus faculty members could be resident faculty with an existing instructional affiliation with the university, including tenured and tenure-track faculty as well as qualified lecturers, classroom instructors or teaching associates.

The specifics of the faculty/staffing plan are driven initially by the projected enrollment in each program. The next gate for staffing is the specific faculty/staff ratio for *each* course required by the curriculum.

Under all faculty staffing plans, there is presently preserved a 1:1 SDSU:Georgian Faculty staffing support ratio. This alignment is driven by the need to have continuous oversight and improvement regarding the delivery of the SDSU curriculum. Although during the transition of primary teaching responsibilities to Georgian faculty, there may be only limited oversight by SDSU faculty, at that time, those available Full-Time Equivalents may be occupied in the development and delivery of new degree programs as anticipated by the program.

The summary table below uses bulk numbers to demonstrate the methodology for determining the staffing plan. It should be remembered in evaluating the staffing plan that for budgetary purposes, *each and every course* was interrogated and parsed according to required teaching staff, appropriate class size, teaching modality, and laboratory resource availability to decide on the optimal teaching resources required.

	CY2	**CY3**	**CY4**	**CY5**	**CY6**
# of Degree Programs	3	3	6	6	7
Degree Program Name	EE CompE Applied Sciences	Applied Sciences EE CompE	Chemistry (AS) Computer Science(AS) CompE CivE ConE	Chemistry (AS) Computer Science(AS) CompE CivE ConE	Chemistry (AS) Computer Science(AS) CompE CivE ConE TBD
# of Classes enrolled in Georgia 2020 (i.e., Fresh, Soph…)	1	2	3	4	4
Courses required (5 per class per semester) - # of	30	60	180	240	280

programs X number of Classes X number of courses required per year (10)					
Required Faculty (1:1 SDSU:Georgia) 1 Faculty teaches 3 courses	10	20	60	80	93

8.7.6.1 Staffing justification

The table above outlines the notional staffing plan. This model is provided as an example for the overall staffing strategy, however, for budget purposes, *each required course* was evaluated to match appropriate faculty/student ratios and resource availability (e.g., laboratory work stations) with the projected enrollment and required teaching modality for that course and degree program.

- Row 1: The number of degree programs impacts how many different disciplinary faculty must be trained and provided. Responsive to the recommendations of the Technical Evaluation Panel, Georgia 2020 will launch with three degree programs: 1) Electrical Engineering; 2) Computer Engineering; 3) Applied Sciences (which has a unified core curriculum for degrees in Chemistry and Computer Science for the first two years. In CY3, Chemistry and Computer Science will bifurcate into their respective upper-division courses, and Civil Engineering and Construction Engineering will be added, raising the number of degree programs to 6.
- Row 2: Classes in the context refers to the student population in each yearly cohort – Freshman, Sophomore, Junior, Senior years of instruction. Each cohort for this summary plan is assumed to be 500 students. We recognize that due to drop out, this will not be steady-state, however, with the introduction of a new freshman class in Civil Engineering and Construction Engineering in CY3, the total student population should remain close to 500 students per year.
- Row 3: To achieve, notionally, 120 credits in four years, each student will have to take approximately 5, 3-credit courses per semester: 5 courses X 3 credits X 2 semesters/year X 4 years = 130 credits. These courses will have to be available each year for each of the offered degree programs. It follows, therefore, that with 3 degree programs, 30 courses per year will have to be offered. Similarly, if there are 6 degree programs, notionally 60 courses per year will have to be offered.
- Row 4: For this overview representation, we can stipulate that each faculty member will have the capacity to teach 3 courses – *or three sections of a single course* each semester. In this overview model, for simplicity the number of students in each course is not explicitly calculated (although it has been calculated and accounted for in our detailed budget development). Therefore, this model allows a single semester load (i.e., three courses, or three sections of a single course) to apply for the entire annual course load. Simply dividing the number of courses required to be provided by three gives a notional required staffing plan. Reviewers may note that degree programs increase in CY7, and staffing requirements continue to increase past the point where instructional responsibilities will largely be transferred to resident Georgian faculty. This planning reflects two key components of the long-term sustainability plan of Georgia 2020: First, A 1:1 SDSU/Partner institution staffing ratio is preserved until the partner institutions may be able to achieve independent ABET accreditation. This reflects the deep and long-term commitment to instructional excellence and continuous collaboration between the faculties and institutions. Second, Georgia 2020 projects adding new degree programs as needs and the market demand. Implementing new program will require staffing plans similar to those projected for the initial degree programs. As the launch programs receive ABET accreditation and are transitioned completely to Georgian partner institution instruction, new disciplines will

be offered from SDSU, requiring continuous resource allocation, even as the specific faculty members change.

8.8 Task 2e - Accreditation Timeline/Strategy

The core methodology of the Georgia 2020 collaborative to facilitate the accreditation of the partner institutions is to overlay SDSU's existing, and accredited, curriculum onto the strong framework already provided by the partner institution. This strategy was selected because it allows for a streamlined curricular development process, takes advantage of the existing capabilities and core competencies of the partner institutions, while also building new capacity, and leads ultimately to the implementation of a curriculum that already has accreditation, thereby reducing the risks within the assessment and accreditation process.

Responsive to the Technical Evaluation Panel comments relevant to review criterion 1, it is vital to recognize that under the preliminary ABET evaluation, two core criticisms were common throughout the Georgian degree programs targeted under Georgia 2020 for development: 1) A lack of consistent assessment of student learning; 2) A lack of sufficient General Education.

SDSU maintains accreditation in all the proposed degrees and is an active partner with ABET and ACS (the two accrediting organizations relevant to the proposed degrees) in a process of continuous improvement not only to maintain accreditation, but also to improve student learning and student capacity to enter the job market in their chosen fields.

In all cases, learning assessments are consistent with accreditation requirements and consist of an appropriate mix of direct and indirect assessments, with appropriate measurement tools. For example, direct assessment includes homework, examinations, class discussion and projects. Indirect Assessment includes qualitative student surveys that assist in adjusting the pace and focus of class lectures and homework, ensuring adequate progress and full compliance in learning outcomes for the students. The required culminating design experiences offered via capstone courses provide a key direct assessment opportunity at the threshold of completing the degrees. Additional direct and indirect postgraduation assessments provide a means of ensuring continued relevancy of the degree offerings to the needs of industry.

ABET accreditation requires consideration of the programs according to several criteria, which have been specifically targeted by the proposed curricula, including:

1. Students – the qualifications of the students that are accepted and the monitoring of their performance against graduation requirements.
2. Program Educational Objectives – the mission of the program and its consistency with the institution's mission, and the achievement of these objectives. This criterion requires a working relationship with industry and an Industry Advisory Board in order to establish objectives and to assess the degree to which graduates achieve them in practice after graduation.
3. Program Outcomes – program outcomes must be established to achieve the program's educational objectives, and performance must be assessed against them. This assessment is made via metrics that are established with both direct and indirect assessments. Culminating experiences are also incorporated in the assessment strategy.
4. Continuous Improvement – Metrics must be monitored over time and used to improve the curriculum in general.
5. Curriculum – program curriculum is defined to achieve the program outcomes, and the details of this connection must be established.

6. Faculty – the, qualifications, size and the composition of the faculty to meet the needs of the curriculum.
7. Facilities – the physical resources (classrooms, labs, offices) available to support the needs of the program.
8. Support – financial resources to allow faculty development and support services of the Departments providing these programs.

Accreditation at SDSU is an institutional priority with management responsibilities falling directly with the chairs of the relevant departments, overseen by the Deans of the colleges, and, ultimately, but the Provost of the university.

At least every six years, programs submit a self-study document detailing the performance of the program against the criteria above. Subsequently, a visit is organized by ABET by a team of independent evaluators who make their own assessment of the accuracy of the self-study and make a recommendation for continued accreditation. The self-studies must include evidence of monitoring against all these criteria throughout the intervening period.

Using the Georgia 2020 collaborative implementation-evolution-transition process, we project that by the time the partner institution programs are eligible for consideration (e.g., have at least one graduate), nearly all programs will be transitioned to partner-institution instruction only, and thereby be appropriate to be submitted under a Request for Evaluation (RFE). We project some programs to potentially be eligible and prepared to submit the RFE as soon as the end of CY5. Hence, by 2020 these programs should be in the process of applying or ready to apply for ABET or ACS accreditation. Other programs may require a longer transition period, and depending on the speed of capacity building within that program, may require as much as two additional academic years.

To directly support accreditation activities, a line-item budget component for accreditation consultation and fees has been included in the Finalist Program Operations. In addition, in recognition of the requirements for appropriate numbers of Ph.D. faculty in the degreed discipline, additional funding has been preserved in the Partner Program Operations as the New Programs Reserve. As described in the budget justification, this funding is a carry-forward balance of Partner Program Operations (partially funded by Georgia 2020 tuition) that is intended to be used, as available, for ABET certification efforts, especially those related to improving the qualifications of the partner institution faculty. Finally, the Finalist Program Operations also sets aside funding to support Doctoral Fellowships as a strategy to further enhance the quality of partner institution faculty by identifying and supporting high-performing students through their doctoral programs in anticipation of their service on the appropriate partner institution faculties.

8.9 Task 2f – Partner Institution Evaluation

Based upon visits, discussions, and review of available documentation, the evaluation of the SDSU Institutional Leadership team closely agrees with the findings of the ABET review team, especially as it relates to the three proposed partner institutions and the target programs. Programs at the partner institutions were recognized for being current, with basic strengths and processes for continuous improvement, but still requiring substantial improvement regarding assessment, General Education requirements, faculty development, and facilities. Following earlier site visits by Deans Stanley Maloy and Paul Wong, the SDSU STEM leadership team visited three universities in the Republic of Georgia during the week of September 28th, 2013 – October 4th, 2013: Ilia State University, Tbilisi State University, and Georgian Technological University. The team spent many hours with the faculty

discussing the programs and courses offered at these universities. The team also requested documentation related to the course outlines and faculty resumes. Based on the personal visits to these universities and the documents submitted by these universities, none of the programs are at a sufficient level for accreditation by ABET at this time, a perspective supported by the recent preliminary evaluation performed by the ABET review team. The goal is to make these programs viable for accreditation in the future, but for now, to meet the immediate need to increase the number of engineering graduates necessary for the economic development of the country SDSU will offer the existing accredited degree programs in parallel with the universities in Republic of Georgia.

The directly collaborative approach proposed here takes advantage of the ABET-recognized strengths while adding targeted improvements recommended for rapidly achieving ABET accreditation. While the existing state of the partner institutions make them ideal partners for a rapid implementation and execution, the general implementation-evolution-transition approach proposed could be applicable to any of the programs reviewed by the ABET Foundation, or any other Georgian partner institutions that may choose to participate in the future.

In addition to the site visits made to potential partner institutions, the SDSU Institutional Leadership met with as many Georgian agencies, Centers and Institutes, and industry representatives as possible, including (in addition to the current partner institutions) Georgian Technological University, Tbilisi State Medical University, Eliava Institute, and the Lugar Center for Public Health Research. Because the implementation of the program is, by definition, limited by available resources, and requires enthusiastic and resource intensive collaboration, only the three partner institutions outlined in this narrative have elected to participate in the initial launch of SDSU's proposed program. Some Georgian institutions will be more appropriate to include in alternate (e.g., certificate) courses of study, other institutions have elected to focus on approaches or partners not aligned with SDSU's collaborative approach, still others are too geographically dispersed to effectively launch the innovative and resource intensive programs at the outset of the project. However, because Georgia 2020 leverages existing infrastructure while implementing ABET/ACS-accredited curricula, other Georgian partner institutions should be included in the future expansion as the project moves from the start-up phase to address key objectives such as access for rural and socially disadvantaged students, for which institutions outside of Tbilisi will be key partners.

8.9.1 Electrical Engineering at Tbilisi State University

The Georgia 2020 collaborative addresses each of the recommendations included in the ABET site review team report. Dr. Lal Tummala, Chair of the SDSU Electrical and Computer Engineering Department, is part of the Institutional Leadership Team and participated in the SDSU site visit to ensure accurate evaluation of the facilities and technical capabilities of the partner institutions. The key strategy for facilitating rapid and streamlined accreditation is the implementation-evolution-transition model that allows the Georgian partner institutions to most efficiently leverage existing accredited programs and optimize them for their delivery infrastructure. Some of the critical recommendations for the existing Electrical Engineering program that are already directly addressed in this narrative are outlined below:

ABET Criterion	Recommendation	Remedy
Criterion 1 – Students	Improve career advice and guidance	Georgia 2020 collaborative integrates an industry stakeholder group to ensure direct connections with employers
Criterion 2 – Program Educational Objectives	Establish a process that enables input from external constituencies,	*Ibid.* Implementing collaboratively developed, SDSU-sourced curricula will meet

	establish and document a set of PEOs that satisfy ABET	this requirement
Criterion 3 – Student Outcomes	Adopt student outcomes that satisfy the definition of student outcomes in the ABET criteria	Implementing collaboratively development, SDSU-sourced curricula will meet this requirement
Criterion 4 – Continuous Improvement	Regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are achieved, prepare to evaluate Student Outcomes at least twice	SDSU curricular policies and practices satisfy this requirement. These will be collaboratively implemented according to the social and cultural norms of Georgia
Criterion 5 – Curriculum	Describe how ECTS credits are determined, improve general education component, and implement a major design experience as a culminating project	Implementing collaboratively development, SDSU-sourced curricula will address these recommendations
Criterion 6 – Faculty	Hire faculty with appropriate degrees and qualifications	SDSU's proposed implementation process will provide appropriate faculty, while allowing for the identification and hiring of new faculty
Criterion 7 – Facilities	Establish IEEE branch, provide adequate and safe research space, provide laboratory equipment, develop online access to resources	Georgia 2020 collaborative facilities development plans include these activities, enrollment as Joint SDSU students will provide digital access to Georgia 2020 students
Criterion 8 – Institutional Support	Provide adequate facilities, classrooms and laboratories	Georgia 2020 collaborative facilities development plans include these activities

8.9.2 Electrical Engineering (Power Engineering) at Georgian Technological University

At Georgian Technological University, the Power Energy (Electrical Engineering) curriculum was recognized by the ABET evaluation committee as one of the top five programs in terms of readiness for modification and subsequent ABET review. Although the emphasis on power in this program makes it less broad than what ABET defines as basic electrical engineering, the existing professional opportunities and learning outcomes that are stated will be a basis for establishing a good set of program educational objectives and student outcomes. There appears to be good support from the dean and faculty members for addressing the needed changes, subject to the availability of adequate funding.

ABET Criterion	Recommendation	Remedy
Criterion 1 - Students	Clarify scheduling and registration Establish opportunities for student internships Provide career counseling	Georgia 2020 establishes a local campus and centralized registration infrastructure. Student internships and career counseling are core components of the successful engineering programs at SDSU.
Criterion 2 – Program Educational Objectives	Establish a process that enables input from external constituencies, establish and document a set of PEOs that satisfy ABET	Implementing collaboratively developed, SDSU-sourced curricula will meet this requirement
Criterion 3 – Student Outcomes	Adopt student outcomes that satisfy the definition of student outcomes in the ABET criteria	Implementing collaboratively development, SDSU-sourced curricula will meet this requirement
Criterion 4 – Continuous	Implement continuous	SDSU curricular policies and practices satisfy

Improvement	improvement processes	this requirement. These will be collaboratively implemented according to the social and cultural norms of Georgia
Criterion 5 – Curriculum	Ensure courses meet the credit-hour requirements Establish a two-semester sequence for major design	Implementing collaboratively development, SDSU-sourced curricula will address these recommendations. Resources for senior design projects and laboratories are provided.
Criterion 6 – Faculty	Address the lack of young faculty	SDSU's proposed implementation process will provide appropriate faculty, while allowing for the identification and hiring of new faculty
Criterion 7 – Facilities	Develop institutionally endorsed repair, upgrade and replacement strategy	Georgia 2020 collaborative facilities development plans include these activities.
Criterion 8 – Institutional Support	Provide adequate facilities, classrooms and laboratories	Georgia 2020 collaborative facilities development plans include these activities

8.9.3 Computer Engineering at Ilia State University

The Georgia 2020 collaborative addresses each of the recommendations included in the ABET site review team report. Dr. Lal Tummala, Chair of the SDSU Electrical and Computer Engineering Department, is part of the Institutional Leadership Team and participated in the SDSU site visit to ensure accurate evaluation of the technical capabilities of the partner institution. The key strategy for facilitating rapid and streamlined accreditation is the implementation-evolution-transition model that allows the Georgian partner institutions to most efficiently leverage existing accredited programs and optimize them for their delivery infrastructure. Some of the critical recommendations for Ilia State Computer Engineering that are already directly addressed in this narrative are outlined below

ABET Criterion	Recommendation	Remedy
Criterion 1 - Students	Enhance opportunities for student internships	Georgia 2020 collaborative integrates an industry stakeholder group and Director of External Relationships to facilitate internship opportunities
Criterion 2 – Program Educational Objectives	Establish and document at set of PEOs that satisfy ABET	Implementing collaboratively development, SDSU-sourced curricula will meet this requirement
Criterion 3 – Student Outcomes	Adopt ABET EAC student outcomes	Implementing collaboratively development, SDSU-sourced curricula will meet this requirement
Criterion 4 – Continuous Improvement	Regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are achieved	SDSU curricular policies and practices satisfy this requirement. These will be collaboratively implemented according to the social and cultural norms of Georgia
Criterion 5 – Curriculum	Conform the curriculum to ABET distribution recruitments; modify the name to meet ABET requirements; require a design	SDSU's proposed collaboratively implemented curriculum meets these requirements

	project proposal; develop a design sequence	
Criterion 6 – Faculty	Hire faculty with appropriate degrees	SDSU's collaborative teaching model and Evolution-Transition strategy achieves this
Criterion 7 – Facilities	Develop modern facilities, provide appropriate maintenance, develop computing cluster	Georgia 2020 collaborative facilities development plans include these activities

8.9.4 Applied Sciences (Chemistry and Computer Science) at Tbilisi State University

Chemistry programs in the U.S. are certified by the American Chemical Society (ACS), not ABET. However, the SDSU Institutional Leadership and Development team executed a collaborative evaluation with Tbilisi State colleagues. Dr. Stanley Maloy, Dean of the SDSU College of Sciences and Professor of Microbiology and Molecular Genetics, and Dr. William Tong, Chair of the SDSU Department of Chemistry and Biochemistry and a Professor of Analytical Chemistry are part of the Institutional Leadership Team and participated in the site visit in Tbilisi to ensure accurate evaluation of the technical capabilities of the Partner Institution. The implementation strategy will continue to leverage the existing institutional infrastructure, as well as the demonstrated and documented enthusiasm of the Tbilisi State faculty to layer the SDSU, ACS-certified curriculum, supported by new infrastructure, within the Tbilisi State degree offerings. The benefits of the implementation strategy in terms of meeting specific ABET accreditation requirements persist through all the proposed degree programs.

Based on the October 2013 visit to Tbilisi State University, Ilia State University, and Georgian Technological University, and on the information received so far from these universities (courses descriptions, syllabi, faculty info, CV, laboratory facilities, major instruments, etc.), the SDSU evaluation indicates that these institutions do not have a Chemistry program at a sufficient level for certification by the American Chemical Society (ACS). San Diego State University will help Georgian partner institutions to develop capacity and build a robust Chemistry degree program with an emphasis in biochemistry and biotechnology by training Georgian faculty, especially in the use of modern instruments (NMR, mass spectrometry, chromatography, Raman, laser spectroscopy, etc.) vital to teaching and training the future biotech workforce needed in Georgia. San Diego State University will offer its ACS-certified chemistry B.S. degree program in parallel with the universities in the Republic of Georgia, with the expectation that Georgian universities will take over later and run ACS-certified chemistry degree programs independently in the future.

8.9.5 Computer Science at Tbilisi State University

The Georgia 2020 collaborative addresses each of the recommendations included in the ABET review team report. The key strategy we will use for facilitating rapid and streamlined accreditation is the implementation-evolution-transition model that allows the Georgian partner institutions to most efficiently leverage existing accredited programs and optimize them for their delivery infrastructure. Some of the critical recommendations for Tbilisi State Computer Science that are already directly addressed in this narrative are outlined below:

ABET Criterion	Recommendation	Remedy
Criterion 1 – Students	Improve career advice and guidance	Georgia 2020 collaborative integrates an industry stakeholder group to ensure direct connections with employers

Criterion 2 – Program Educational Objectives	Establish and document at set of PEOs that satisfy ABET	Implementing collaboratively developed, SDSU-sourced curricula will meet this requirement
Criterion 3 – Student Outcomes	Adopt student outcomes that satisfy the definition of student outcomes in the ABET criteria	Implementing collaboratively developed, SDSU-sourced curricula will meet this requirement
Criterion 4 – Continuous Improvement	Regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are achieved	SDSU curricular policies and practices satisfy this requirement. These will be collaboratively implemented according to the social and cultural norms of the Republic of Georgia
Criterion 5 – Curriculum	Include nontechnical courses that increase student understanding and appreciation of global, societal, ethical and professional issues	SDSU's proposed collaboratively implemented curriculum has specific General Education requirements to address this gap
Criterion 6 – Faculty	Consider unifying faculty to provide a unified undergraduate curriculum	SDSU's proposed collaboratively implemented curriculum will provide unity while maintaining faculty diversity in research interests
Criterion 7 – Facilities	Develop state-of-the-art facilities, provide appropriate maintenance, develop computing cluster	Georgia 2020 collaborative facilities development plans include these activities
Criterion 8 – Institutional Support	Add laboratory equipment that supports student inquiry and enables projects beyond the required areas of study	Georgia 2020 collaborative facilities development plans include these activities

8.9.6 Future Programs Compact Year 3 – Civil/Construction Engineering at Ilia State University

The draft Civil/Construction Engineering program proposed by Ilia State University was not eligible for detailed evaluation by the ABET review team,. However, the SDSU Institutional Leadership and Development team executed a collaborative evaluation with Ilia State colleagues. Dr. Ken Walsh, Chair of the SDSU Civil, Construction, and Environmental Engineering Department, is part of the Institutional Leadership Team and participated in the site visit to ensure accurate evaluation of the technical capabilities of the partner institution. The implementation strategy will continue to leverage the existing institutional infrastructure, as well as the demonstrated and documented enthusiasm of the Ilia State faculty to layer the SDSU, ABET-accredited curriculum, supported by new infrastructure, within the Ilia State degree offerings. The benefits of the implementation strategy in terms of meeting specific ABET accreditation requirements persist through all the proposed degree programs. Specific recommendations referenced throughout the ABET evaluation reports relevant to other programs are common with the proposed Civil/Construction Engineering program, but will be addressed by the collaborative implementation strategy as described.

9 Task 3 – Enrollment

Target enrollment estimates are based on both published data collected by the ABET review team and personal communication with partner institution collaborators and administrators. Enrollment projections are proportionate to existing and projected enrollment from partner institutions. Eighty percent of qualified students at the partner institutions are expected to matriculate initially to the Georgia 2020 program seeking an SDSU degree. As the Georgian faculty gain capacity to deliver ABET-accredited courses independently, the proportion that matriculate to the Georgia 2020 program is projected to decrease, although overall enrollment in both the partner institution programs and the Georgia 2020 programs is projected to increase, based on demand. Under consultation with the partner institutions, Georgia 2020 will use an enrollment strategy that leverages the first compact year (CY1) to establish a program office with appropriate recruiting and outreach capabilities. CY1 will focus on constructing and/or renovating facilities, recruiting students, faculty, and staff, enhancing existing relationships with partner institutions, and developing additional relationships with academic, industry, and government institutions to further enhance the quality and impact of the Georgia 2020 program. With an intensive enrollment effort consuming the first 12 months of the project, enrollment is projected to approach 500 students in CY2.

Responsive to the Technical Evaluation Panel comments relevant to review criterion 3, detailed recruitment and enrollment strategies are outlined in response to Task 12 – Recruitment, Admission, Preparation Plan.

Enrollment will be closely tied to student preparedness. For the Georgia 2020 collaborative enrollment projections, the program has accepted projected enrollment from the partner institutions, and assumed that 80% of the matriculating students will have sufficient English language skills and score sufficiently high on subject-matter assessment examinations for direct enrollment into the SDSU degree program.

However, responsive to the comments of the Technical Evaluation Panel, Georgia 2020 will establish a recruitment strategy that will identify, and provide potential bridging opportunities to, students interested in the program prior to their national examination date.

Outreach, admissions and enrollment will be a completely collaborative activity with SDSU and Georgia 2020 working in close partnership with Ilia State University and Tbilisi State University. During the launch of the program, budget projections anticipate the availability of some funds to flow from the Georgia 2020 collaborative to the partner institutions based on enrollment in the degrees hosted there. Because the partner institutions may receive additional resources, above and beyond both required infrastructure upgraded and direct support of faculty and staff, proportionate to the students participating in the program at their institution, incentives will be aligned to stimulate active partnership on outreach and enrollment.

9.1 Task 3a – Current Georgian Partner Institution Program Enrollment

9.1.1 Electrical Engineering – Reported at Tbilisi State University

Electrical Engineering			
Men	Women	Total	Socially Disadvantaged
68	99	77	1

Using existing and projected enrollment estimates, at all three partner institutions, enrollment in Electrical Engineering is estimated to launch with 124 students in CY2. As noted above, Georgian

Technological University will also host an Electrical Engineering program with a concentration in Power, making their students potential admits to the Georgia 2020 program.

9.1.2 Computer Engineering – Reported at Ilia State University

Initial enrollment targets and projections are based historical data is available from the partner institutions, and where possible have been used to baseline the initial year of the program and project growth toward CY5.

Computer Engineering			
Men	Women	Total	Socially Disadvantaged
91	6	97	5

Ilia State University presently reports 97 students in Computer Engineering, based upon the ABET evaluation. These estimates have been incorporated into the Civil/Construction Engineering enrollment estimates to meet the requirements of the documentation.

Ilia State recognizes that their outreach to women and socially-disadvantaged students has been limited. Resources described elsewhere (e.g., Task 12) will be leveraged to improve student preparation at the K-12 level, and also implement strategies to facilitate access for socially-disadvantaged students that may qualify for admission, except for their English-Language skills.

The current student ratio of women at Ilia State University is about 48% women across all programs, but only 5% in engineering. Student projections anticipate that the value of the accredited degree program will increase women participation of women to about 10% in CY2 with a 4% increase per year for both Ilia State degrees.

9.1.3 Applied Sciences Chemistry – Tbilisi State University

Tbilisi State University's Chemistry program was not evaluated by the ABET review team, however in collaboration with colleagues at the Partner Institution, Georgia 2020 has collected the following limited enrollment data:

Tbilisi State University – Chemistry			
Men	Women	Total	Socially Disadvantaged
69	220	289	18

The Tbilisi State University Chemistry program reported 10 graduates in 2013, The program is rapidly growing based upon the enrollment at the start of degree years 1, 2 and 3 (Semesters 1, 3, 5).

9.1.4 Applied Sciences Computer Sciences – Tbilisi State

The Computer Science program at Tbilisi State University is administered by the Department of Computer Sciences in the Faculty of Exact and Natural Sciences. The faculty in the Department of Computer Sciences is partitioned into four areas or subgroups: Theoretical Informatics, Practical Informatics, Applied Informatics, and Technical Informatics. Specific statistical information was required to be collected for the program, and summary information is supplied below.

Tbilisi State University presently has a robust student body within its existing Computer Science degree program. The existing demand suggests that enrollment into the Georgia 2020 collaborative program may be more rapid. Our enrollment projections remain conservative and informed both by information from the partner institution and current enrollment data. The enrollment projection for Applied Sciences (which will include both Chemistry and Computer Sciences) is 248 students for CY2, largely driven by the demand for accredited Computer Science degrees.

The current ratio at of women is at least 42% in Chemistry/Biology/Computer Science. Enrollment projections assume 2% increase per year to reach and to reach 50% target enrollment for women.

Tbilisi State University – Computer Science			
Men	Women	Total	Socially Disadvantaged
312	109	421	13

The Tbilisi State University Chemistry program reported 126 graduates in 2013, The program has good strength per enrollment at the start of degree years 1, 2, 3 and 4 (Semesters 1, 3, 5, 7).

Combined, the Applied Sciences degree is projected to enroll 248 students in CY2. This enrollment projection is largely driven by the high demand for accredited computer science degrees in Georgia.

9.1.5 Future Programs Compact Year 3 – Civil and Construction Engineering – Ilia State University

Civil and Construction Engineering is a specifically targeted future program with planned phase-in in CY3. This program meets a strong industry demand in the Republic of Georgia, but is delayed in implementation for a number of specific strategic reasons. First, the program will be housed in a new building constructed with MCA-Georgia Investment funds and housed on existing Ilia State University land. Although the first two years of instruction could be provided under the General Education infrastructure of the program and would not require the specialized laboratories to be housed in the new construction, a delay was deemed prudent to ensure that the upper-division laboratories would, without question, be ready when needed. Second, in consultation with our primary degree partners at Ilia State University, we decided that additional time to identify and directly train qualified faculty with appropriate degrees and licensure would be appropriate for this degree program, especially. Therefore, we have outlined additional faculty development strategies, including co-advising of existing masters students and provision of graduate research fellowships (described elsewhere in this proposal), that will address these start-up risks. Third, delayed implementation of a new degree program allows Georgia 2020 to target enrollment in such a way that drop-out from the initial programs can be back-filled by improved enrollment mid-stream in the Civil and Construction Engineering program.

Ilia State does not have a current Civil or Construction Engineering program. However, based upon consultation with faculty collaborators and industry partners, a conservative estimate for CY2 student population at Ilia State in these disciplines of Engineering is 132 students.

9.2 Task 3b – Current Student dropout and graduation rates

Dropout and graduation rates are an important component of enrollment projections. However, after close consultation with the visiting partner institution leaders January 27-29, it became apparent that dropout rates are not necessarily consistently calculated in an easily reported format. Overall, partner institutions reported an intra-university transfer rate from one major to another of about 15%. This rate does not represent any net loss in student body at the institution. Dropout rates from the institutions (i.e., students that leave the university environment) are exceedingly low, and reported by our colleagues as less than 4%. For Georgia 2020 enrollment calculations, a bulk dropout rate of 8% was selected. This rate is justified because the outlined selection and preparatory programs should aid in identifying and enrollment highly motivated and highly capable students.

9.2.1 Electrical Engineering – Tbilisi State

Tbilisi State University calculated the graduation rate as the percentage of 7th semester students who graduated in the same academic year rather than as the percentage of the entering cohort who graduated four years later.

1. Overall graduation rate (for all graduates in the previous year): 55%
    a. Graduation rate for females: 40%
        i. Graduation rate for females below 70,000 points on Georgia's social vulnerability scale: NA
        ii. Rate for female graduates of Georgian origin: NA
        iii. Rate for female graduates of Armenian origin: NA
        iv. Rate for female graduates of Azerbaijani origin: NA
    b. Graduation rate for males: 59%
        i. Graduation rate for males below 70,000 points on Georgia's social vulnerability scale: NA
        ii. Rate for male graduates of Georgian origin: NA
        iii. Rate for male graduates of Armenian origin: NA
        iv. Rate for male graduates of Azerbaijani origin: NA

9.2.2 Electrical Engineering – Georgian Technological University

1. Overall graduation rate (for all graduates in the previous year): 52%
    a. Graduation rate for females: 81%
        i. Graduation rate for females below 70,000 points on Georgia's social vulnerability scale: NA
        ii. Rate for female graduates of Georgian origin: 81%
        iii. Rate for female graduates of Armenian origin: NA
        iv. Rate for female graduates of Azerbaijani origin: NA
    b. Graduation rate for males: 43%
        i. Graduation rate for males below 70,000 points on Georgia's social vulnerability scale: NA
        ii. Rate for male graduates of Georgian origin: 43%
        iii. Rate for male graduates of Armenian origin: NA
        iv. Rate for male graduates of Azerbaijani origin: NA

9.2.3 Computer Engineering – Ilia State University

Ilia State University, the only Partner Institution with an existing Computer Engineering program, does not yet have any graduates, so this section does not apply.

9.2.4 Computer Science – Tbilisi State

Tbilisi State University calculated the graduation rate as the percentage of 7th semester students who graduated in the same academic year rather than as the percentage of the entering cohort who graduated four years later.

2. Overall graduation rate (for all graduates in the previous year): 79%
    a. Graduation rate for females: 95%
        i. Graduation rate for females below 70,000 points on Georgia's social vulnerability scale: NA
        ii. Rate for female graduates of Georgian origin: NA
        iii. Rate for female graduates of Armenian origin: NA

iv. Rate for female graduates of Azerbaijani origin: NA

b. Graduation rate for males: 69%
   i. Graduation rate for males below 70,000 points on Georgia's social vulnerability scale: NA
   ii. Rate for male graduates of Georgian origin: NA
   iii. Rate for male graduates of Armenian origin: NA
   iv. Rate for male graduates of Azerbaijani origin: NA

9.3 Task 3c – The year in which enrollment will begin for Finalist degree programs

Enrollment projections are proportionate to existing and projected enrollment from partner institutions. Eighty percent of qualified students at the Partner Institution are expected to matriculate to the Georgia 2020 program seeking an SDSU degree. These projections assume enrollment begins in CY2 with 20% increase in enrollment and 5% dropout rate.

9.4 Task 3d – Initial level of student enrollment

Enrollment projections are proportionate to existing and projected enrollment from partner institutions. Enrollment projections reflect the projected number of students expected to enter the lower-division course curriculum leading to the degrees offered. Current CY2 enrollment projections are: 124 in Electrical Engineering; 124 in Computer Engineering, and 248 in Applied Sciences (Chemistry and Computer Science).

9.5 Task 3e – Project the proportion of women and disadvantaged students

Women and socially and economically disadvantaged student populations represent important resources for the development of innovative and creative-based economies. Diverse groups, in some cases, have been shown to out-perform groups made up of only the best experts, but with a uniform social and cultural background. The Georgia 2020 partner institutions have recognized their need to improve recruitment of women and socially and economically disadvantaged students, especially in engineering disciplines. Georgia 2020 uses projections roughly consistent with existing distribution percentages. To expand participation of these groups, we will use a series of targeted interventions and outreach programs to increase the participation of women and disadvantaged students from its current proportion to levels representative of the population in general by CY7.

Georgia 2020 will encourage application by groups underrepresented in STEM disciplines, including women, minorities and economically or socially disadvantaged students. Attracting these underrepresented groups to the STEM degree programs will be done primarily in two ways: (i) actively market the university programs to high schools with good reputations for STEM training and high numbers of such students; (ii) leveraging female and socially and economically disadvantaged students recruited to the STEM degree programs to help recruit new students from these groups who meet the criteria for admission. These approaches have been very effective at SDSU, where the undergraduate population is approximately 57% female, with no majority ethnic group on campus, and one of the highest graduation rates of public universities in the U.S.

A third, innovative, strategy will interrogate Georgian national examination scores to identify students that do not score above the threshold for admission to the national university system. Although these low-scores may simply be the result of under-performing students, it is possible that this group will be

over-represented by socially-disadvantaged students that could become good candidates for admission with one or more of the services and support systems proposed by Georgia 2020: (1) English Language Preparatory Institute; (2) STEM Preparatory Institute; (3) National Examination Preparation; 4) Living expenses fellowship to facilitate participation in these programs in Tbilisi. All of these interventions are specifically budgeted in the Finalist Program Operations (see English/STEM Preparatory Education Program, and Student Living Scholarships).

9.5.1 Strategies and services to enhance the enrollment of women and socially vulnerable students

9.5.1.1 English Language Institute

If necessary to facilitate the objective of building opportunity for students from underrepresented groups, the Georgia 2020 collaborative will provide an intensive English Language Institute designed to provide remediation, supplemental support, and general English education in preparation for enrollment in degree programs. SDSU is perfectly positioned to rapidly launch this program based on our extensive experience training non-native English speakers in our Linguistics program our campus-based Language Acquisition Resource Center (LARC) American Language Institute (ALI).

Through the recruitment process (described in detail in Task 12), students will be assessed for language ability via either the ALI language assessment or LARC's Computer Assisted Screening Tool (CAST), and for written proficiency via the Writing Proficiency Assessment (WPA) and evaluation criteria used for all students at SDSU. [WE MENTION ASSESSMENT, BUT DO WE EXPLICITLY SAY THAT STUDENTS WILL BE PLACED IN COURSES BASED UPON THEIR PERFORMANCE?]

If students are found to be deficient in language ability, they may be invited to participate in the English Language Institute, a multi-track program designed to rapidly improve language ability for matriculation into the Georgia 2020 programs. Classes used for training will include LING94, LING100, LING200, LING281, and LING305W. Multiple sections can be offered in parallel, allowing students with differing abilities to enter the institute at an appropriate level. Courses will be 6-week intensive sessions, with one or two sessions offered each summer. Where necessary, students may be offered living assistance stipends to facilitate their participation in Tbilisi.

Student learning outcomes are stated on each course syllabus and these outcomes are measured through a number of writing assignments (on average 4 papers) throughout the course. If one course has multiple sections, following the same syllabus, each section targets the same outcomes and measures the outcomes the same way.

LING 94. Developmental Writing for International or Bilingual Students (3) Cr/NC (Same course as Rhetoric and Writing Studies 94) Intermediate written English with emphasis on problems of nonnative speakers; discussion of sentence, paragraph, and essay writing skills. Open only to ESL students who have not satisfied the SDSU Writing Competency requirement. Students earning a grade of "Cr" satisfy the SDSU writing competency requirement. Students receiving a "NC" should re-enroll in Rhetoric and Writing Studies 94 or Linguistics 94.

LING 100. English Composition for International Students (3) [GE] Prerequisite: Satisfaction of the English Placement Test and Writing Competency requirements. (See Graduation Requirements section of catalog.) Proof of completion of prerequisite required: Copy of EPT or competency scores (including ISEPT) or verification of exemption; proof of Cr in Rhetoric and Writing Studies 92. Introduction to college-level written English; attention to English language/grammar needs of non-native speakers of English; grammatical and rhetorical techniques for effective writing, based in part on study of models of

current American writing. Not open to students with credit in a higher-numbered composition course or Africana Studies 120 or American Indian Studies 120 or Chicana and Chicano Studies 111B or English 100 or Rhetoric and Writing Studies 100 or 101.

LING 200. Advanced English for International Students (3) [GE] Prerequisites: Satisfaction of the English Placement Test and Writing Competency requirements; and Linguistics 100. Proof of completion of prerequisites required: Test scores or verification of exemption; copy of transcript. Further practice in mastering conventions of standard academic writing, with emphasis on strategies for research in writing papers. Focus on language issues specific to non-native speakers of English. Not open to students with credit in Africana Studies 200, Chicana and Chicano Studies 200, English 200, or Rhetoric and Writing Studies 200.

LING 281. Academic Reading and Writing for Second Language Learners and International Students (3) (Same course as Rhetoric and Writing Studies 281) Prerequisite: Open only to students who qualify for Rhetoric and Writing Studies 280 and whose first language is not English. Academic prose, emphasizing purposes, structures, and styles of academic English writing. Designed to improve students' ability to plan, draft, revise, and edit essays, as well as to read and analyze complex academic texts. Additional emphasis on grammatical features of English relevant to the second language population.

LING 305W. Advanced Composition for International Students (3) Prerequisites: Satisfies Graduation Writing Assessment Requirement for students who have completed 60 units; completed Writing Placement Assessment with a score of 8 or higher (or earned a C or higher in RWS 280, 281, or LING 281 if score on WPA was 7 or lower); and completed General Education requirements in Composition and Critical Thinking. Proof of completion of prerequisites required: Test scores or verification of exemption; copy of transcript. Advanced expository writing, with practice in the various associated skills (organization, research, presentation, rhetoric). The goal is to enable non-native English speakers to function completely with written English on advanced university levels. This course may not be used toward the major or minor in linguistics.

9.5.1.2 STEM Preparatory Training

The Georgia 2020 collaborative recognizes that a core objective of the capacity building effort is to stimulate participation from women and socially disadvantaged groups (ethnic minorities, rural students, and students from economically disadvantaged families). These students, and others, as appropriate, may be engaged in a STEM Preparatory Institute (SPI) targeted to recruit, prepare, and enroll talented students in the Georgia 2020 collaborative STEM curricula. The SPI will use an articulated curriculum that includes recruiting and introductory activities, mentorship and advising, student cohorts, and preparatory training that prepares students to understand themselves as an individual technical professional, understand relevant groups and organizations in STEM disciplines, and understand engineering in a global environment. This outreach effort will be coordinated with other host nation programs like those being implemented by Delta Systems to improve K-12 teacher training and student preparation.

As detailed in Task 12, students at appropriate points in the recruitment process will be invited to voluntarily take SDSU's Mathematics Assessment Examination and Chemistry Placement Examination. If they are found to be deficient in these STEM disciplines, they may be invited to participate in the STEM Preparatory Institute. The SPI will follow a remedial curriculum based on SDSU's existing Chem 100 course, which is the remedial course for aspiring chemistry majors that do not place into Chem 200, the first chemistry course offered by the SDSU-Georgia program. Chemistry 100, an introduction to general

chemistry, will be offered by Georgian partner universities to students who cannot take Chem 200 directly. By the end of this remedial Chem 100 course a successful student will be able to:

1. Execute basic chemistry calculations such as unit conversions and stoichiometry;
2. Explain the basic principles of atomic theory and chemical bonding;
3. Quantitatively and qualitatively describe physical and chemical properties of matter;
4. Illustrate the concept of dynamic equilibrium with acid-base chemistry;
5. Analyze a problem and decide the best method to solve;
6. Understand how the material relates to examples drawn from news and life;
7. Combine material learned in individual chapters to form an overall "big picture";
8. Safely and confidently conduct protocols in a laboratory environment.

These activities are directly supported through a budgeted line-item of $400/student, *in addition* to directly budgeted instructor salaries for instruction during CY1, when no university courses are to be offered. These efforts and expenditures are *exclusively* dedicated to identifying and preparing an appropriate student body for matriculation into the program in CY2.

Finally, students from socially-disadvantaged groups that show either aptitude or willingness to participate, or both, but may have difficulty with the Georgian National Examination may be offered targeted National Examination preparatory courses in addition, or instead of, either the English Preparatory or STEM Preparatory courses.

Students from existing pipeline communities, as well as those from socially disadvantaged groups will be actively recruited via educational outreach coordinators in collaboration with Georgian national priorities and cultural norms. As much as possible, relevant digital media (e.g., Twitter, Facebook, LinkedIn, YouTube, etc) will be used as an accessible entry portal for engaging potential students. Promotional material will be distributed regarding the Georgia 2020 collaborative at education and career fairs, in both urban and rural settings. Presentations will be made to student and professional groups, and at relevant student orientations and conferences. Outreach will be coordinated with local schools and academic advisors and counselors.

Students will gain access to academic mentors/advisors that will follow them through the Georgia 2020 collaborative process providing opportunities to pair with industry professionals and faculty and graduate students in their field, and also prepare students to adapt quickly to the professional work environment.

9.5.1.3 Georgian National Examination Preparation

Georgia 2020 will coordinate with the National Examinations Center and the initiatives of the President of Georgia, to develop and deliver programs that aim to provide equal competitive conditions for representatives of ethnic minorities in the Unified National Examinations. The program aims to create Unified National Examinations Preparatory Centers on a public school basis in Akhalkalaki, Ninotsminda, Marneuli, Bolnisi and Kharadjala – areas densely populated with minorities.

In the preparatory centers, potential university entrants will be trained by local specialists. Georgia 2020 will coordinate with the National Examinations Center for consulting with and training teachers and distributing to them relevant Examinations Programs and additional materials.

9.5.1.4 Preparatory Training

Student success, especially from socially disadvantaged groups, depends not only on academic preparation, but on an introduction to the expectations of the academic community. Where possible,

curricula that introduce and prepare students for long-term success in the university environment will be applied in parallel with any required remedial English-Language training, or implemented in parallel with other programs seeking to improve student preparation (e.g., the Delta Group)

Part I: Understanding the individual

- Personality and values (strengths, passions, areas for growth, attitudes, motivation, job satisfaction)
- Leadership and management (taking control of your life, emotional intelligence, self-management, time management, stress management)
- Opportunities, resources, support (Career Services, Library Services, scholarships and financial aid, study groups, academic advising, professional organizations, tutoring, support groups, family, friends)
- Communicating effectively (managing conflict, negotiating successfully)

(Assignments: Personality assessment, preferred communication style assessment, biography, resume, personal goals and aspirations, interview preparation and practice)

Part II: Understanding groups and organizations (focus on academia and engineering)

- Group behavior (networking, mentoring, building a support team for success)
- Organization structure and culture (leadership styles, management, culture, values, ethics, power, politics, work groups, work teams)
- Human resources policies and practices (recruiting, selection process, diversity, performance evaluations, salary and benefits negotiation)

(Assignments: research four companies, attend two networking events, join at least one professional organization, join at least one volunteer organization, and cultivate at least four mentors)

Part III: Understanding engineering in a global environment

- Engineering work force trends (past, present and future)
- Engineering environment (regional, national, global)
- Innovating, adapting and managing change in engineering organizations

(Assignments: research engineering and work force trends)

9.5.2 Enrollment Summary

Preliminary research within the faculty, student and employer communities suggest a high level of demand for internationally-recognized degreed individuals to advance the next generation of innovation and economic growth in the Republic of Georgia. Our research indicates not only enthusiastic willingness to participate on the part of partner institution Faculty, but pent-up student demand for degrees that are internationally relevant, and that can increase the competitiveness of Georgia 2020 graduates in today's global economy.

Under consultation with the partner institutions, Georgia 2020 will use an enrollment strategy that leverages the first compact year (CY1) to establish a program office with appropriate recruiting and outreach capabilities. With an intensive enrollment effort consuming the first 12 months of the project, enrollment is projected to approach 500 students in CY2. CY1 will focus on constructing and/or

renovating facilities, recruiting students, faculty, and staff, enhancing existing relationships with partner institutions, and developing additional relationships with academic, industry, and government institutions to further enhance the quality and impact of the Georgia 2020 program

The enrollment projections are conservatively grounded in data from STEM higher education in the Republic of Georgia today. Our conservative approach to enrollment projection anticipates enrollment of 610 new students during CY5 and exceeding the target of 2000 total enrollment during CY5 well ahead of the target for CY7.

The Georgia 2020 collaborative program proactively recognizes the objective to improve access and capacity of socially-disadvantaged and women student groups, and as part of the enrollment strategy, includes specific preparatory programs that will enhance and enable the participation of these important groups. These programs are further detailed in the response to Task 12.

Finally, by leveraging the flexibility of the MCA-Georgia award, the Georgia 2020 collaborative will actively incentivize support from the partner institutions in outreach and enrollment by providing available funding proportionate to the number of students enrolling in the SDSU degree programs hosted by each partner institution. This active collaboration will be vital to meeting the enrollment targets because the partner institutions are well positioned to design and implement effective outreach and enrollment campaigns based on their intimate understanding of the pool of potential students.

10 Task 4 – Faculty and Staff

Faculty and support-staff are a critical part of the educational delivery system. It is the objective of the Georgia 2020 collaborative to provide infrastructure and support to enable the partner institutions to build their own capacity sufficient to provide and maintain ABET/ACS-accredited programs. In addition, intensive start-up requirements, facilities construction and management, and administrative duties require appropriate levels of senior management oversight. Staffing levels vary at research institutions in the United States and internationally. The Georgia 2020 collaborative will strive to maintain staffing levels within existing reported ranges of support staff-to-faculty ratios between 1:3-5, and faculty-to-administrator ratio levels around 3:1.

10.1 Task 4a – Current state of Georgian Partner Institution Faculty and Staff

Whenever possible, the following data was acquired by the ABET review committee, with other data provided from institutional documentation.

10.1.1 Electrical Engineering – Tbilisi State University

As reported by partnering faculty at Tbilisi State University, the Department of Electrical and Electronics Engineering was founded in 2007.

Teaching staff: 2 Professors, 1 Associated Professor; 2 Assistant Professors

Scientific staff: 12 scientists and engineers

Most of the staff are IEEE members

10.1.2 Electrical Engineering – Georgian Technological University

1. Total number of faculty members in the program: 158
    a. Total number of female faculty members: 63
        i. Number of full-time female faculty members: 50

ii. Number of female faculty members whose highest degree is
    1. BS: 13
    2. MS: 24
    3. PhD: 26
iii. Number of female faculty members whose origin is
    1. Georgian: NA
    2. Armenian: NA
    3. Azerbaijani: NA

b. Total number of male faculty members: 95
    i. Number of full-time male faculty members: 64
    ii. Number of male faculty members whose highest degree is
        1. BS: 0
        2. MS: 16
        3. PhD: 79
    iii. Number of male faculty members whose origin is
        1. Georgian: NA
        2. Armenian: NA
        3. Azerbaijani: NA

10.1.3 Computer Engineering – Ilia State University

Ilia State University is the only Partner Institution with an existing Computer Engineering program.

2. Total number of faculty members in the program: 20
    a. Total number of female faculty members: 5
        i. Number of full-time female faculty members: 1
        ii. Number of female faculty members whose highest degree is
            1. BS: 0
            2. MS: 2
            3. PhD: 3
        iii. Number of female faculty members whose origin is
            1. Georgian: 5
            2. Armenian: 0
            3. Azerbaijani: 0
    b. Total number of male faculty members: 15
        i. Number of full-time male faculty members: 1
        ii. Number of male faculty members whose highest degree is
            1. BS: 3
            2. MS: 9
            3. PhD: 3
        iii. Number of male faculty members whose origin is
            1. Georgian: 15
            2. Armenian: 0
            3. Azerbaijani: 0

10.1.4 Chemistry – Tbilisi State University

1. Total number of female faculty members: 0 Full, 1 Assoc., 7 Asst.
    a. Number of full-time female faculty members: 8
    b. Number of female faculty members whose highest degree is
        i. BS: 0

ii. MS: 0
iii. PhD: 8

c. Number of female faculty members whose origin Is:
i. Georgian: 8
ii. Armenian: 0
iii. Azerbaijani: 0

2. Total number of male faculty members: 4 Full, 3 Assoc., 1 Asst.
a. Number of full-time male faculty members: 8
b. Number of male faculty members whose highest degree is
i. BS: 0
ii. MS: 0
iii. PhD: 8
c. Number of male faculty members whose origin is
i. Georgian: 8
ii. Armenian: 0
iii. Azerbaijani: 0

10.1.5 Computer Science – Tbilisi State University

1. Total number of female faculty members: 10 full time, 15 adjunct
a. Number of full-time female faculty members: 10
b. Number of female faculty members whose highest degree is
i. BS: 0
ii. MS: 4
iii. PhD: 6
c. Number of female faculty members whose origin Is:
i. Georgian: 10
ii. Armenian: 0
iii. Azerbaijani: 0
2. Total number of male faculty members: 15 full time, 20 adjunct
a. Number of full-time male faculty members: 15
b. Number of male faculty members whose highest degree is
i. BS: 0
ii. MS: 1
iii. PhD: 14
c. Number of male faculty members whose origin is
iv. Georgian: 15
v. Armenian: 0
vi. Azerbaijani: 0

10.1.6 Future Programs Compact Year 3 – Civil/Construction Engineering – Ilia State University

Ilia State University does not currently offer bachelors degree programs in Civil and Construction Engineering. However, a program in Civil Engineering with an Environmental Engineering concentration has been proposed. At present, the university maintains a few staff, primarily in areas of Earth Science and Geophysics, Architecture, and Mathematics/Computer Science, who could participate in such programs. Based on information from the partner institution, the data below are estimated from that set of faculty presently active at ISU.

10.1.6.1 Number of Faculty and Staff, Specialization, rank, gender

1. Number of existing faculty likely able to participate in Civil/Construction Engineering Programs
    a. Number of full-time faculty members: 3
    b. Number of part-time faculty members: 2
2. Number of faculty members whose highest degree is
    a. BS: 1
    b. MS: 2
    c. PhD: 2

10.1.7 Average fully-loaded compensation levels

Full Professor - $27,069USD

Associate Professor - $17,712USD

Assistant Professor - $10,453USD

Lecturer/Invited Teacher - $8,640USD

10.2 Task 4b – Faculty Staffing plan

There are 4 teaching modalities that will be employed for delivery of course work; they are as follows:

1. Collaborative Teaching: Appropriately qualified faculty member at the Partner Institution appointed as adjunct faculty at SDSU. The quick-start launch pad for the ongoing collaboration will be a six-week introduction to SDSU, the campus, campus policies and practices, and a direct team-teaching opportunity to orient the Georgian faculty, who will become SDSU lecturers at their home institutions, to ABET-accredited practices in place at the campus in San Diego.
2. Cooperative Teaching: American trained lecturers participate fully in the launch of the course curricula in Georgia.
3. Online Delivery: Modules, both synchronous and asynchronous, reading and video assignments, and online exercises. Consistent with accreditation practices, students will interact with each other online, but also in appropriately scheduled in-person discussion sections moderated by a host institution Teaching Assistant or Lecturer. These courses also include opportunities for online meetings in which the professor will answer questions posed by the students
4. Hybrid Delivery: Two-week period of intensive in-person instruction at the beginning of the course, with subsequent instruction consisting of distance lecture each week with support from a host institution Lecturer or Teaching Assistant. This hybrid delivery modality is scripted in great detail to insure instruction hours and learning outcomes consistent with the accreditation requirements of SDSU.

Partner institution faculty will participate in orientation at SDSU prior to delivering the accredited collaborative courses. For courses taught during the summer, the SDSU orientation may be done over a summer session, while for other course it will take place during an academic semester. The Georgia 2020 program will pay for travel including per diem, and the Partner Institution will cover their faculty's salary during the orientation period. Responsive to the Technical Evaluation Panel comments relevant to review criterion 2, additional detail on faculty training is provided below.

Responsive to the Technical Evaluation Panel comment relevant to criterion 4, we further outline the faculty staffing plan below.

The details of the faculty staffing plan are embedded in the budget worksheets, particularly the FACULTY/STAFF sheet. However, here some basic premises will be outlined that will serve as justification for the proposed staffing levels, and the attendant salary and fringe costs.

First, Georgian Faculty/Staff are defined as any resident, qualified instructor capable of securing an affiliation with one of the partner institutions. At the heart of the program will be existing qualified faculty, but this cohort may be expanded to include ex-patriot Georgians living in the United States that may have sufficient training and desire to repatriate to Georgian and serve as on the faculty. SDSU/Host Campus faculty are similarly any resident faculty with an existing instructional affiliation with the university, including tenure and tenure-track faculty as well as qualified lecturers, classroom instructors or Teaching Associates.

The specifics of the faculty/staffing plan are driven initially by the projected enrollment in each program. The next gate for staffing is the specific faculty/staff ratio for *each* course required by the curriculum.

Under all faculty staffing plans, there is presently preserved a 1:1 SDSU:Georgian Faculty staffing support ratio. This alignment is driven by the need to have continuous oversight and improvement regarding the delivery of the SDSU curriculum. Although during the transition of primary teaching responsibilities to Georgian Faculty, there may be only limited oversight by SDSU faculty, at that time, those available Full-Time Equivalents may be occupied in the development and delivery of new degree programs as anticipated by the program.

The summary table below uses bulk numbers to demonstrate the methodology for determining the staffing plan. It should be remembered in evaluating the staffing plan that for budgetary purposes, *each and every course* was interrogated and parsed according to required teaching staff, appropriate class size, teaching modality, and laboratory resource availability to decide on the optimal teaching resources required.

	CY2	**CY3**	**CY4**	**CY5**	**CY6**
# of Degree Programs	3	3	6	6	7
Degree Program Name	EE CompE Applied Sciences	Applied Sciences EE CompE	Chemistry (AS) Computer Science(AS) CompE CivE ConE	Chemistry (AS) Computer Science(AS) CompE CivE ConE	Chemistry (AS) Computer Science(AS) CompE CivE ConE TBD
# of Classes enrolled in Georgia 2020 (i.e., Fresh, Soph…)	1	2	3	4	4
Courses required (5 per class per semester) - # of programs X number of Classes X number of courses required per year (10)	30	60	180	240	280
Required Faculty (1:1 SDSU:Georgia) 1 Faculty teaches 3 courses	10	20	60	80	93

10.2.1.1 Staffing justification

The table above outlines the notional staffing plan. This model is provided as an example for the overall staffing strategy, however, for budget purposes, *each required course* was evaluated to match

appropriate faculty/student ratios and resource availability (e.g., laboratory work stations) with the projected enrollment and required teaching modality for that course and degree program.

- Row 1: The number of degree programs impacts how many different disciplinary faculty must be trained and provided. Responsive to the recommendations of the Technical Evaluation Panel, Georgia 2020 will launch with three degree programs: 1) Electrical Engineering; 2) Computer Engineering; 3) Applied Sciences (which has a unified core curriculum for degrees in Chemistry and Computer Science for the first two years. In CY3, Chemistry and Computer Science will bifurcate into their respective upper-division courses, and Civil Engineering and Construction Engineering will be added, raising the number of degree programs to 6.
- Row 2: Classes in the context refers to the student population in each yearly cohort – Freshman, Sophomore, Junior, Senior years of instruction. Each cohort for this summary plan is assumed to be 500 students. We recognize that due to drop out, this will not be steady-state, however, with the introduction of a new Freshman class in Civil Engineering and Construction Engineering in CY3, the total student population should remain close to 500 students per year.
- Row 3: To achieve, notionally, 120 credits in four years, each student will have to take approximately 5, 3-credit courses per semester: 5 courses X 3 credits X 2 semesters/year X 4 years = 120 credits. These courses will have to be available each year for each of the offered degree programs. It follows, therefore, that with 3 degree programs, 30 courses per year will have to be offered. Similarly, if there are 6 degree programs, notionally 60 courses per year will have to be offered.
- Row 4: For this overview representation, we can stipulate that each faculty member will have the capacity to teach 3 courses – *or three sections of a single course* each semester. In this overview model, for simplicity the number of students in each course is not explicitly calculated (although it has been calculated and accounted for in our detailed budget development). Therefore, this model allows a single semester load (i.e., three courses, or three sections of a single course) to apply for the entire annual course load. Simply dividing the number of courses required to be provided by three gives a notional required staffing plan. Reviewers may note that degree programs increase in CY7, and staffing requirements continue to increase past the point where instructional responsibilities will largely be transferred to resident Georgian faculty. This planning reflects two key components of the long-term sustainability plan of Georgia 2020: First, A 1:1 SDSU/Partner institution staffing ratio is preserved until the partner institutions may be able to achieve independent ABET accreditation. This reflects the deep and long-term commitment to instructional excellence and continuous collaboration between the faculties and institutions. Second, Georgia 2020 projects adding new degree programs as needs and the market demand. Implementing new program will require staffing plans similar to those projected for the initial degree programs. As the launch programs receive ABET accreditation and are transitioned completely to Georgian partner institution instruction, new disciplines will be offered from SDSU, requiring continuous resource allocation, even as the specific faculty members change.

For budget purposes, all SDSU average salaries are based on the California State University "Salary Schedule for Instructional Faculty, Special Programs" with compensation ranging from Instructor through Professor depending on the course (upper/lower division, modality, etc.). For example, for GE courses, instructors will be compensated at $1522 per unit. Assuming an average of 15 units per semester (includes 3 units of office hours and other activity), 2 semesters per year, a full time instructor teaching 15 units per semester would have a salary of $1522 X 15 X 2 = $45,660. Adding 42% for SDSU fringe benefits makes the total compensation for 1 FTE instructor at $64,837.

Georgian faculty compensation (Georgian Lari or GEL): GE Faculty led courses are Full professor tenure track, 2nd level earning 3000 GEL per month. For co-instruction the Full Professor tenure tracking 1st level earning 2400 GEL per month was used. For Lecturers, Associate Professor tenure track 1st level at 2000 GEL per month was used, and for Laboratory instruction Assistant Professor tenure track at 1500 GEL per month was used. All have 20% fringe rate applied and an exchange rate of approximately 0.6 U.S. dollars to 1 GEL.

Reviewers may note that SDSU staffing requirements plateau and do not taper off past the point where instructional responsibilities will largely be transferred to resident Georgian faculty. This planning reflects two key components of the long-term sustainability plan of Georgia 2020: First, A 1:1 SDSU/Partner institution staffing ratio is preserved until the partner institutions may be able to achieve independent ABET accreditation. This reflects the deep and long-term commitment to instructional excellence and continuous collaboration between the faculties and institutions. Second, Georgia 2020 projects adding new degree programs as needs and the market demand. Implementing new program will require staffing plans similar to those projected for the initial degree programs. As the launch programs receive ABET accreditation and are transitioned completely to Georgian partner institution instruction, new disciplines will be offered from SDSU, requiring continuous resource allocation, even as the specific faculty members change.

Responsive to the Technical Evaluation Panel comments relevant to review criterion 4, a more robust and detailed administrative staff is proposed.

Easily interpreted from the Faculty/Staff budget tab, partial administrative FTEs represent a single, or two people whose responsibilities cut across all three proposed degree programs. Where whole FTE are indicated, that indicates each program will have that number of staff dedicated. The overall approach is to establish and maintain a central oversight office with administrative capacity similar to SDSU's satellite campus in Calexico, CA (which serves about 600 students locally), and simultaneously maintain both student/faculty affairs capabilities along with degree specific staff at each of the partner institutions.

Table 14. Central Staff for Georgia 2020 responsible for general administration

Central Staff
Dean
Associate Dean
Director, External Relations
Director, Admissions
Director, Facilities
Director, Information Technology Systems
Admissions Assistant (2)
Finance Assistant (2)

Table 15. Staff to be located at each partner institution to facilitate student and faculty affairs.

Campus Staff – at each partner institution
Director, Student/Faculty Affairs
Assistant, Student Affairs/Admissions

Support Staff (3)

10.3 Task 4c – Recruiting Plan

Faculty and staff needs will evolve during the life of the program, and will be primarily driven by the co-equal objectives: 1) to provide internationally recognized accredited degrees in priority disciplines and; 2) To enable capacity to be built at Georgian partner institutions sufficient to enable them to earn appropriate accreditation.

As noted above, the Georgia 2020 collaborative will utilize an implementation-evolution-transition model to achieve the program objectives.

Implementation phase faculty will be primarily full-time faculty with Ph.D. degrees in the relevant discipline. The SDSU faculty who will teach at the Georgia 2020 collaborative will represent the demographics of our campus faculty – approximately 60% male and 40% female. These faculty will be recruited through departments and interdisciplinary programs at SDSU. Attached are representative CVs of faculty who would be of the caliber recruited to teach in Georgia.

For SDSU faculty assigned to teach at the Georgia 2020 collaborative, the salary will be based on what they currently receive at the main campus of SDSU. For faculty from Georgian partner institutions who teach at the Georgia 2020 collaborative through adjunct SDSU appointments, salary decisions will be based on agreements to be made between the administrations of the Georgia 2020 project and the Georgian partner institutions. Budget analyses have been made based on the full articulation of enrollment projections and curricular requirements.

Identification and hiring of appropriate faculty will require a portfolio approach, as no single approach is likely to result in adequate hires.

SDSU provides numerous opportunities for faculty development, including an outstanding Center for Improvement of Teaching and Learning that works with faculty to integrate new approaches to education, an Instructional Technology Center that works with faculty to develop online resources for delivering courses or innovative content, and several internal grant programs that provide resources for faculty to travel to participate in international scholarly meetings. These educational resources would be available for all participating faculty. A portion of the resources will also be used to promote international collaborations. In addition, there will be incentives for faculty to work at the Georgia 2020 collaborative during sabbatical leaves.

SDSU's Institutional Leadership and Development Team have also identified a number of prospective strategies to meet the recruiting needs of the degree programs. Substantial communities have been identified in the United States with appropriately Ph.D. credentialed Georgian national scientists, engineers and researchers who can be leveraged as a pool of dual-appointed faculty to further facilitate and accelerate the growth of capacity at the Georgian Partner Institution. These US-based communities have been identified associated with cultural centers (e.g., Georgian Orthodox Church) as well as geographic centers (e.g., New Brunswick, NJ and San Francisco, CA).

In further recognition of the need for faculty in Georgia, the Georgia 2020 budget under Partner Program Operations has secured a line-item carry-forward for ABET certification and new programs. Because improved faculty qualifications is a specific requirement for ABET certification, these funds,

averaging $250,000/year for CY4-7, could be used for recruitment of faculty that would facilitate the accreditation process.

Finally, Georgia 2020 will implement an innovative faculty development and recruitment strategy by providing graduate research fellowships to masters level students interested in pursuing a Ph.D. in a Georgia 2020 discipline, and willing to commit a period of service to the partner institution upon completion. These funds are secured in the Finalist Program Operations as part of long-term capacity building, and will be committed under a program to be finalized collaboratively with the partner institutions. Disciplines with strong research components may be most appropriate for initial implementation, and detailed preliminary discussions have already occurred with Ilia State University. Conceptually, U.S. faculty and Georgia faculty would act as collaborative thesis advisors allowing students to pursue their research in the Republic of Georgia with intensive research or course experiences in the US, as required by the degree. This program would not only support the development of Georgian talent, but would also facilitate direct research collaboration among Georgian and US faculty.

10.4 Task 4d – CY7 Target Faculty Levels

Target faculty levels are dependent on the projections of enrollment across the initial 4 degree programs. Overall, taking into account transition of fully ABET/ACS-accredited curricula and emphasizing Georgian faculty-led courses where feasible, projections are for 45 new faculty at Georgian partner institutions.

10.5 Task 4e – Plans for strengthening Georgian Faculty

Responsive to the Technical Evaluation Panel comments relevant to review criterion 2, a more complete discussion of the Georgian Faculty training process follows.

> "The questions of students are often the source of new research. They often ask profound questions that I've thought about at times and then given up on, so to speak, for a while. It wouldn't do me any harm to think about them again and see if I can go any further now. The students may not be able to see the thing I want to answer, or the subtleties I want to think about, but they remind me of a problem by asking questions in the neighborhood of that problem. It's not so easy to remind yourself of these things.
>
> So I find that teaching and the students keep life going, and I would never accept any position in which somebody has invented a happy situation for me where I don't have to teach. Never.
>
> —Richard Feynman, in Surely You're Joking, Mr Feynman!"

Georgian faculty interested in or assigned to contribute to the Georgia 2020 program will be included in either a 6-week orientation, or an instructional teaching experience lasting for a full SDSU semester. Budget support and projected costs for these experiences have been described elsewhere in the proposal. Which orientation will depend on the complexity of the course they are to collaboratively or cooperatively teach. For example, upper-division chemistry courses have important safety components and complex instrumentation required. These skills cannot be transferred over a limited intensive instructional period and would require the full semester teaching experience. Georgian faculty may engage in more than one teaching experience for multiple courses, dependent on their interests, or, more than one teaching experience for a single course may be offered to ensure adequate familiarity with the course material and instrumentation.

SDSU Faculty will engage Georgian Faculty similar to highly-experienced Teaching Assistants and offer practical teaching experience in the field. The additional support lent by the Georgian faculty member will serve as incentive for participation by the host faculty.

The teaching experience will involve delivery of SDSU courses and assisting faculty or other teaching staff with professional and technical activities.

A three-day intensive training workshop will be offered for visiting Georgian faculty, based on departmental trainings maintained for Graduate Teaching Associates, the week before classes begin either during the summer session, or semester. There will be additional general Professional Development Workshops and scheduled biweekly meetings for the Georgian faculty engaged in the orientation program. The introductory and ongoing workshops may include topics such as, but not limited to:

Initial Workshop/Orientation Meetings

- Introduction to philosophy and text of method
- Practicum (demonstrations of sample lessons)
- General Resources (Instructional Technology Services, etc.)
- Departmental Resources
- Experience Sharing (by experience TA and/or Part-Time Lecturers)
- Organizational Tasks (syllabi, daily lesson planning etc.)
- Policy questions: grading, significance of grades, add/drop procedures, control of classroom environment, office hours, class visitations (by Lower-Division Director, Coordinator, Chair of the Department)

Ongoing Training

- Each session the Director of the program, the Coordinator or other designated faculty will make visitations to classes being taught by Georgian faculty.
- Individual conferences will be scheduled after classroom visits to discuss the Faculty's teaching performance as part of his/her ongoing training.
- Each semester or orientation period there will be professional development workshops meant to assist all Georgian faculty in the ongoing training process.
- Faculty will be kept abreast of new resources and developments in their fields in order to further their familiarity with pedagogical methodologies.

The criteria for faculty recruitment will be based on standards that have been established at SDSU for the STEM disciplines and for general education courses required for graduation and for ABET/ACS accreditation. Annual reviews of faculty performance will be undertaken to assess the quality of faculty teaching, research, and service.

This process will be in parallel to the previously described co-teaching and observational methodologies proposed to raise the quality of instruction and outcomes at the home campus.

10.6 Task 4f – Number and type of Program administrative staff for ABET accreditation

The Georgia 2020 methodology leverages the existing infrastructure at the partner institutions and implements a currently accredited curriculum consistent with the initial ABET review report

recommendations to not expend funds to review/enhance the existing curriculum at the partner institutions. Georgia 2020 will utilize the currently accredited curriculum at SDSU and adapt it to meet the objectives of this program to develop high quality, accredited STEM bachelors degree programs at the partner institution. In parallel to making existing online courses available, additional courses will be added and developed with costs identified specifically for those purposes. Online synchronous courses will be recorded and made available asynchronously and will also be included in the Library/Data Media Center. For women and socially disadvantaged groups, we intend to develop special courses, as described above, dealing with issues impacting this targeted group of the Georgian population and making courses available at no cost to these target populations.

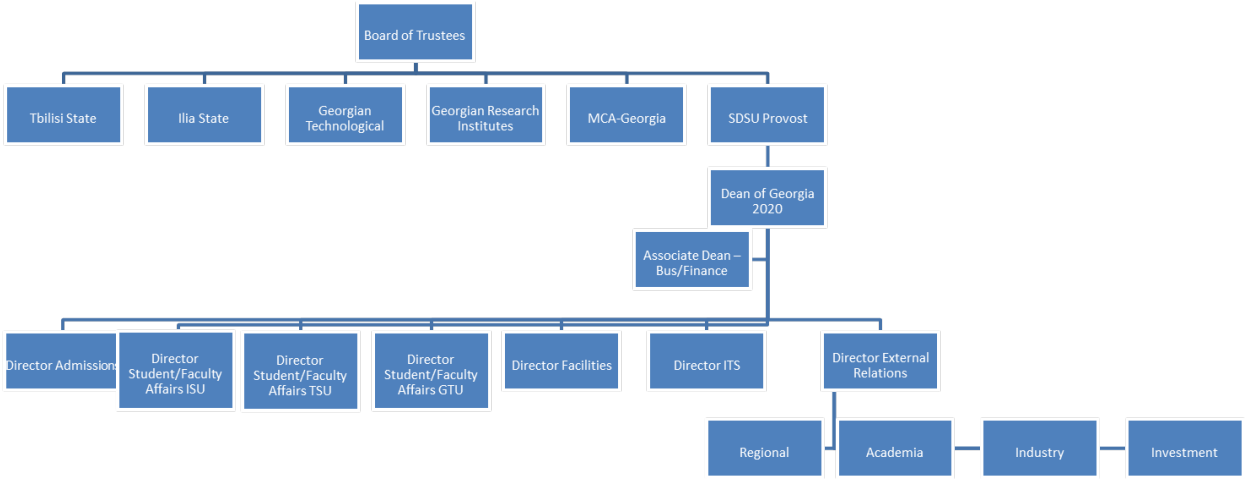
To directly support accreditation activities, a line-item budget component for accreditation consultation and fees has been included in the Finalist Program Operations. In addition, in recognition of the requirements for appropriate numbers of Ph.D. faculty in the degreed discipline, additional funding has been preserved in the Partner Program Operations as the New Programs Reserve. As described in the budget justification, this funding is a carry-forward balance of Partner Program Operations (partially funded by Georgia 2020 tuition) that is intended to be used, as available, for ABET certification efforts, especially those related to improving the qualifications of the partner institution faculty. Finally, the Finalist Program Operations also sets aside funding to support Doctoral Fellowships as a strategy to further enhance the quality of partner institution faculty by identifying and supporting high-performing students through their doctoral programs in anticipation of their service on the appropriate partner institution faculties.

For every course there will be at least one SDSU faculty and one Partner Institution faculty assigned as either lead or support to facilitate ABET certification, transition of teaching from SDSU to Partner Institution, quality assurance, etc. In addition, we propose hiring necessary full-time support staff for laboratories. Partner institution faculty and support staff will receive compensation under the SDSU program budgets for lead/support effort associated with all SDSU courses. Compensation will be based on Georgian wages (not SDSU) with a 20% fringe benefit rate.

10.7 Task 4g – Number and type of Program administrative staff for Finalist degree

10.7.1 Organizational Structure

Key to successful accomplishment of the Program objectives and requirements of the contract will be the performance of the management team and supporting members. Accordingly, the Program will be managed as a collaborative partnership with academic, scientific and administrative oversight from the Program Steering Committee; strategic guidance and resource support services from the External Advisory Board; programmatic and operational direction from the Executive Committee, which will be staffed by key members of the Principal Partners; and selected activity and processes support from stakeholders, and other service providers. The following Organizational and Management Chart depicts the core structure of the program:



10.7.2 Management Structure

In addition to Program Leadership consisting of the SDSU Provost, and SDSU-Georgia Dean, the Georgia 2020 collaborative will be managed as a partnership headed by an Advisory Board with representatives from the Program's principal partners including San Diego State University, Georgian Technological University, Tbilisi State University, Ilia State University, a representative from the Tbilisi research institution community, and the Millennium Challenge Corporation. Together, the SDSU Provost, management staff, and the Board of Trustees serve collectively to provide program governance. The Advisory Board will include the Provost and the Deans of the College of Sciences, College of Arts and Letters, College of Engineering, and College of Extended Studies from SDSU. The members from Georgia will include the Rectors of our primary partner institutions or their representatives. Two additional members from Georgia will be selected from other major institutes of scientific research, such as the directors of the Eliava Institute and the Richard Lugar Center. An important goal of the Georgia 2020 collaborative is to strengthen the ties between SDSU, our partner institutions in Georgia, and other major research institutes of Georgia that may choose to join the collaborative effort in a more meaningful way during later years. The collaboration will permeate all the academic units so that the faculty and staff of the cooperating institutions will have the opportunity to develop joint research and curriculum. The composition of the board is a reflection of this important goal.

Program personnel will be an appropriate combination of US-based and Georgian academic administrators. Program management will have primary responsibility for filling senior management positions within the first six months.

Responsive to the Technical Evaluation Panel comments relevant to criterion 4, Georgia 2020 has added substantial central administrative staff as well as senior administration to be located at each of the partner institutions, with attendant support staff. This administrative model includes central, in-country management for elements that impact the entire program and distributed leadership at each of the partner institution campuses

The details of the staffing structure can be seen in the Finalist Program Operations budget. The structure and duties of the senior staff are outlined below.

Georgia 2020 Central Administration
Dean
Associate Dean – Business and Finance
Director – External Relations

Director – Admissions
Director – Facilities
Director – Information Technology Systems
Admissions Assistant (2)
Finance Assistant (2)

Georgia 2020 Campus Administration
Director Student/Faculty Affairs
Assistant Student Affairs/Admissions
Support Staff (3)

Georgia 2020 Dean

The dean shall have primary responsibility for representing the requirements of SDSU faculty for the program to all groups and persons external to SDSU, particularly to the Government of Georgia institutional partners, MCA-Georgia, MCC, and industry partners. The Dean shall be responsible for the administration and efficient conduct of the educational program and for integrating the plans of the program with those of SDSU. The dean shall enforce the policies and regulations adopted by the Board of Trustees, the Office of the SDSU President, the SDSU Faculty Senate, and SDSU faculty. As chief academic officer of the unit, the Dean is responsible for the academic, personnel, financial, and administrative affairs of the program. The Dean is also responsible for communicating the vision and goals of Georgia 2020 collaborative to community and professional constituencies and seeking public and private funds to support the goals of the program. The Dean will be a member of the Advisory Board representing San Diego State University.

Associate Dean, Budget and Finance

The Associate Dean will be responsible for the development of the Georgia 2020 collaborative financial management strategy and will contribute to the development of the program's strategic goals. In addition to the strategic components, the Assoc. Dean will be the fiscal administrator of the prime contract and subcontracts, and will provide oversight and review of all reports and deliverables, administration of project staff appointments, budget adjustments, and reconciliation of financial reports to the approved budget. The Assoc. Dean may be charged with developing and implementing more sophisticated policies and procedures both in the finance and general operational realms; advise the Dean and other key members of senior management on financial planning budgeting, cash flow, investment priorities, and policy matters; serve as the management liaison to the select stakeholder groups and External Advisory Committee; effectively communicate and present critical financial matters at select board and committee meetings; represent the organization externally, as necessary, particularly in banking and lease negotiations; oversee, direct, and organize the work of the finance and operations teams; upgrade and implement an appropriate system of policies, internal controls, accounting standards, and procedures; plan, coordinate, and execute the annual budget process; ensure that the Georgia 2020 project is adhering to the contract plan, delivering status reports as required; provide analytical support to internal management team, including development of internal management reporting capabilities.

Director of Student/Faculty Affairs (at each partner institution)

The Director of Student/Faculty Affairs will oversee a variety of student services and faculty needs at each partner institution. The director will be responsible for recruiting prospective students; developing and overseeing the implementation of a marketing strategy, including developing recruitment materials and events; assisting with developing admissions strategies and providing analysis of admissions projections and class configurations; evaluating applications and enrollment readiness assessments; helping formulate levels and configurations of financial aid packages; developing annual tuition and financial aid budgets; advising students on admissions processes, course registration, degree requirements, and/or other program or SDSU policies and procedures; providing career services, including career counseling, job and internship placement, and developing and maintaining career resources library; planning and implementing orientation, and/or activities and events designed to build cohort coherence and enhance student involvement in the program; acting as a student advocate and counsels students in disputes with university; identifying and overseeing the development of technological solutions to improve operating efficiencies and managing transfer of data to central repositories; analyzing data and developing reports; supervising support staff.

Director of External Relations

The Director of External Relations should be a dynamic, business minded, proactive individual with strong technical and communications skills. Working closely with the management team, the Director of External Relations is also responsible for strengthening public awareness and support of the Georgia 2020 initiatives, as well as securing additional funding for core operations and special projects. Primary responsibilities include, but are not limited to: communications and marketing; build relationships with a broad spectrum of organizations including partner institutions, service groups, service providers, and committees for special projects; manage strategic development of marketing and communications initiatives, including mobile apps, and social media; fund development, including planning, directing, and managing aspects of fund development efforts, identification of needs, cultivation of individual, corporate, government, and foundation donors; identify and develop new business opportunities and strategic partnerships with for profit and nonprofit organizations; public affairs, including raising the profile of the Georgia 2020 project through presentations at national and international conferences; communication with the media; cultivate relationships with elected officials and other national and local leaders.

Director of Admissions

The Director of Admission will be responsible for assisting with the management of the activities and results of the Admissions team in accordance and compliance with applicable university policies, procedures, regulatory agencies and legal requirements. Partner with and mentor Admissions/Outreach Representatives to ensure prospective students are enrolled for degree and certificate programs. Provide training and coaching to Admissions Representatives on information available for programs and student eligibility requirements; provide assistance to students completing admission applications; and review applications and related documentation for compliance.

Director of Facilities

The Director of Facilities will be responsible for planning and leading facilities improvement initiatives, managing, directing and supervising the staff and evaluating program results in the facilities area. S/he will review facilities departments for compliance with applicable rules and regulations; Provide staff and partners oral and written interpretation of policy and applicable rules and regulations; receive, address, and respond to inquiries, requests for information, grievances and public complaints related to facilities

issues and/or information; attend and participate in meetings with directors and other administrative personnel to address planning and coordination of facilities issues with other departments; evaluate facilities program results and prepare various reports for review by the Dean; assist in strategic planning, plan short and long term priorities, goals and strategies; direct the budget development processes; assess facilities budgets for alignment with contract goals; review and monitor administration of funds; assess and monitor the implementation of plans designed to achieve priorities and goals. The Director of Facilities will also provide feedback as needed to ensure quality of work and accomplishment of goals; interact with community organizations to enhance communication; engage support to understand community perceptions that impact the success of the program's facilities function; collect and reviews crisis management, emergency response, environmental safety plans from campuses and facilities; monitor implementation of practice drills; staffs and supervises the positions of Assistant Director of Facilities and IT/Communication Coordinator.

Director of Information Technology Services

The director of Information Services is responsible for the management, direction, and strategic planning for the all information services and technology systems, including all budgeting and personnel decisions. The ITS Director is responsible for the acquisition, installation, and evaluation and maintenance of all the servers, computers, network equipment, telecommunications systems, classroom technology systems and databases supporting the program.

11 Task 5 – For each program proposed, detail the facilities and equipment needs for Finalist degree programs and Georgian Partner Institution programs seeking to obtain ABET accreditation

Responsive to Technical Evaluation Panel comments relevant to review criteria 6 and 8, SDSU engaged Saunders Group Ltd. from Tbilisi as consultants to develop an Independent Inspection Assessment and Cost Estimate for required renovations and construction. This report is provided as an Appendix (21) to justify estimated costs. The requirements for renovated and new classrooms and laboratories totals approximately 29,750 sq. ft. of refurbished space and 11,500 sq. ft. of teaching space. Both the rehabilitation and construction will meet local and international standards for educational facilities and meet both MCC and IFC guidelines.

In summary, the proposed rehabilitation works at Tbilisi State University are for 24,900 sq.ft. of teaching and laboratory spaces and involve Chemistry, Physics and Electrical Engineering Laboratories. There is also a requirement for lecture Halls and smart computer classrooms.

The proposed new construction works at ISU are for 11,500 sq.ft. of teaching spaces and involve Civil Engineering and Electrical Engineering Laboratories. There is also a requirement for associated public and administration areas. The ISU has already started on architectural designs for a proposed construction.

The proposed rehabilitation works at GTU are for 4850 sq. ft. of teaching spaces and involves Electrical Engineering Laboratories and 2000 sq. ft. of modern biochemistry laboratory space.

Distribution of degrees can be easily understood by reviewing where laboratory infrastructure will be renovated or constructed, and vice versa. Details can be found in the budget appendices, but the summary table below, when taken together with the narrative to follow, will aid in clarifying the facility needs of this complex program.

	Georgian Technological University	Ilia State University	Tbilisi State University
Laboratory-Degree	Power Systems/EE	General EE Lab/EE	General EE Lab/EE
	Power Electronics Lab/EE	Antenna&Microwave Lab/EE	Computer Lab/EE
	Senior Design Lab/EE	Senior Design Lab/EE	Storeroom/EE
	Computer Classroom/GE-EE	Computer Lab/EE	Laboratory Office/EE
	Storeroom/EE	Storeroom/EE	Intro to Physics/GE
	Laboratory Office/EE	Laboratory Office/EE	Lecture Hall/GE
	Library Digital Media/GE	Hydraulics Lab/Civ-ConE	Smart/Computer Class/GE-CS
	Hydraulics Lab/Civ-ConE	Structural Lab/Civ-ConE	
	Geotechnical Lab/Civ-ConE	Geotechnical Lab/Civ-ConE	
	Surveying Lab/Civ-ConE	Surveying Lab/Civ-ConE	

Chemistry Laboratory Renovations – Tbilisi State University
Chemistry GE 101/201
Chemistry 232/432
Chemistry 417-427-457
Chemistry 457 Special
Chemistry 567
Georgian Technological University
Chemistry GE 101/201
Chemistry 567

11.1 General Education

It is anticipated that the GE courses of the SDSU degree programs in Georgia will consist of a number of courses offered at Ilia State and Tbilisi State. There will also be a number of courses offered online (about one fourth).

The classes to be offered by SDSU faculty in Georgia will include:

- Oral and Written Communication
- American Institutions

The facilities and equipment needs are as follows:

- Classrooms (will use existing classrooms at Ilia and Tbilisi State)
- Writing and Oral Communication Labs (up to 100 workstation labs to be used in conjunction with the written and oral communications classes, as well as for the online classes. The labs should be equipped with 100 desk top computers and 4 monitoring computers (for instructional use)

Some computer labs exist at the partner institutions, but the required GE courses will need a 100-workstation lab or two 50-workstation labs at each partner institution. The labs will be used for written and oral communication classes with appropriate software for writing and language learning. The

estimated cost of each workstation is $1,500 for the computer and $500 for software. To meet this requirement, appropriate resources have been allocated in the project budget.

Existing classrooms at the partner institutions and new dedicated classrooms will be used for lectures and regular classes. Renovation or construction of these spaces, as appropriate, has been budgeted as described in the budget proposal, and supported by the inspection and cost estimate from Saunders Group.

11.2 Electrical/Computer Engineering

Facilities space requirements for labs are indicated in the Detail MCC Budget spreadsheet, along with requirements for storage and technician office. Additional justification for estimated costs are included in the Cost Estimate from the Saunders Group (Appendix 21), however final space requirements have been updated for the MCC Budget since the cost estimate was provided. The Electrical/Computer Engineering programs will requires access to classrooms with space for at least 40 students, and at least 2 with space for 100 for courses to be taught in large sections. All classrooms will require smart podiums including two projectors and two computers - one to run/show faculty in US, one for a local projection of the materials at the Partner Institution. This will support both the intensive and the online modalities.

Some classrooms at Ilia State University and Georgian Technological University are in good conditions for large sections. The classrooms at Tbilisi State University appear to be small and need to be modified to accommodate the class sizes discussed above. Classrooms at Georgian Technological University will be upgraded. Most classrooms visited and evaluated have sufficient projector and podium, but will need some upgrade.

To build capacity at Ilia State University, we are proposing the construction of a new building adjacent to other STEM educational facilities on the Ilia State University campus. No such plans were under consideration at Tbilisi State University. Electrical and Computer Engineering programs will share space with existing programs at both institutions. Space will comply with US Building and fire safety codes and SDSU standards as described in the facility evaluation by the Saunders Group.

11.2.1 Minimum facility space requirements

Facility requirements for the Electrical and Computer Engineering programs include classroom space, multi-purpose computer laboratories, and traditional physical laboratories for Electronics, Digital Design, Communication, Antenna and Microwaves, Senior Design, storage and office space for a technician. In the initial phase, Electrical Engineering program along with the labs will be developed at Tbilisi State University and Computer Engineering along with the labs will be developed at Ilia State University although these laboratory spaces have some cross-disciplinary utility. Advanced Power Engineering laboratories including a Power Systems/Power Electronics lab will be developed at Georgian Technological University. The space requirements for each of the labs are outlined in the Detailed MCC Investment Budget. Our initial plan is to place Electronics Labs (EE 210L, EE 330L, EE430L), and Antenna and Microwave Lab will be located at Tbilisi state University. Digital Labs (COMPE 270L, 375L, 470L, Digital communication Lab) will be located at Ilia State University. All three institutions will provide space for senior Design Laboratory. Future plans include additional EE laboratory space at Georgian Technological University.

Classroom needs for the programs include access to classrooms with space for 40 students in each, and 2 classrooms with space for 100 students. This number of classrooms is predicated on the assumption that the spaces can be shared between all the engineering programs at Ilia State and Tbilisi State. This is critical for this program in order to support the use of these classrooms during the time windows where

work times reasonably overlap between Ilia State, Tbilisi State and San Diego State. Each classroom should be outfitted with a smart podium, to include Macintosh and Windows computers, laptop hookups, a document camera, and VCR/DVD. All classrooms should be outfitted with sound systems, to include microphones. These classrooms should also be outfitted with two projectors. These should connect to the equipment in the podium, to allow projection during instruction. They must also be individually configurable, to allow one of them to depict a video image with a white board and the other to depict a screen capture, when used for online and hybrid instructional modalities.

11.2.2 Evaluation of existing facilities

Dr. Lal Tummala, Chair of SDSU's Electrical and Computer Engineering Department, was part of the Institutional Leadership Team and participated in the site visit to ensure accurate evaluation of the facilities and technical capabilities of the Partner Institutions. He found their facilities to be very limited for the first phase of offering SDSU degrees. Our purpose is to develop/ modify the existing labs at both the partner institutions in the first two years of the compact to meet the program requirements. Modification of the existing space and /or creating new space also will be coordinated with respective universities in the first two years of the compact.

11.2.3 Travel costs

Determination of faculty needs during implementation and operation have taken into account the following factors:

a. Course requirement
b. Status of Georgian partner institution Curriculum
c. Status of Georgian partner institution Faculty
d. Projected Enrollments

Based on the course requirements, enrollment, and preferred teaching modalities, travel and other costs have been computed on a per-degree basis and incorporated into the budget estimates.

11.2.4 Rehabilitation needs

Laboratories to support the Electrical and Computer Engineering are further described here. For each laboratory, equipment has been designed to support student learning of design of experiments and also of the specific concepts to be analyzed. Student learning will be enhanced by the preparation of laboratory reports to describe the experiments conducted and the related physical phenomena, along with calculations to demonstrate their knowledge of the various theories being demonstrated. All laboratories will be sized to support up to 30 students in a single section.

Circuits Laboratory (EE 210L): This laboratory will provide hands-on experience with the analysis and design of electric circuits. Transient analysis of circuits containing passive elements such as resistors, capacitors and inductors will be studied. Operational Amplifier circuits will be explored. Software tools will be used to confirm the results obtained from these experiments.

Engineering Electronics Laboratory (EE 330L): This laboratory will include experimental study of laboratory instruments, diodes, rectifier circuits, filters, transistors and operational amplifiers

Electronic Circuits Laboratory (EE 430L): This laboratory investigates dynamic characteristics of solid state devices, single and multi-stage amplifier circuits with feedback, tuned amplifiers, voltage regulators, active filters, and A/D-D/A converters.

Antenna and Microwave Laboratory (EE 540L): This laboratory will investigate the characteristics of microwave devices and antennas

Digital Communication Laboratory (EE 558L): This laboratory will investigate different modulation techniques, effects of noise on system performance, digital filters, and signal processing.

Digital design Laboratory (COMPE 270L): This laboratory gives hands on experience with the design of digital systems using logic circuits. Design of combinational and sequential circuits are included in this lab.

Embedded Systems Laboratory (COMPE 375): Microcontroller architecture and programming using Assembly Language are investigated in this laboratory

Digital Circuits Laboratory (COMPE 470L): This laboratory provides hands on experience with the design of digital electronic systems using commercially available digital integrated circuits and software.

9.4.5 Identification of existing equipment

The partner institutions have some test equipment and circuit boards used for introductory circuit and electronics labs. Currently available equipment is shown below. Some of this equipment is old and need to be updated.

- Oscilloscope Tektronix TDS 2012
- Oscilloscope LeCroy WaveRunner 204Xi, 2GHz, 10G/s
- Agilent EMI Test Receiver AGIL-8546A, 9kHz - 6.5 GHz
- Waveform generator WG-820
- Function generator Tektronix AFG 3552
- Network Analyzer HP 8720B 130MHz-20GHz
- Network Analyzer HP8752A 300kHz-3GHz
- LCR Meter Escort ELC 3133A
- FCC BCI Probe F-140, FCC RF Current Probe F-61, FCC RF Current Probe F-52
- DARE EMC Test System:
- RadiSense - LASER-powered EM field sensors from 10 kHz to 18GHz
- RadiCentre - 1-channel main frame CTR1001S with RadiSense plug-in card RadiSupply LPS1001A

11.3 Applied Sciences (Chemistry and Computer Science)

Dr. William Tong, Chair of the SDSU Chemistry Department, was part of the Institutional Leadership Team and participated in the site visit to ensure accurate evaluation of the facilities and technical capabilities of the Partner Institutions. Based on the October 2013 visit to Tbilisi State University, Ilia State University, and Georgian Technological University, and on the information received so far from these universities (courses descriptions, syllabi, faculty info, CV, laboratory facilities, major instruments, etc.), these institutions do not have a Chemistry/Biochemistry/Biotechnology program at a level that can be certified by the American Chemical Society, the organization that certifies all chemistry programs and departments in the United States. San Diego State University will support Georgian partner institutions in developing capacity and building Chemistry/Biochemistry/Biotechnology degree programs by training Georgian instructors, especially the use of modern instruments (nuclear magnetic resonance or NMR, mass spectrometry, chromatography, Raman, laser spectroscopy, etc.) in teaching and training the future biotechnology workforce needed in Georgia. San Diego State University will offer its American Chemical Society certified chemistry degree programs in parallel with the partner institutions in the Republic of Georgia, with the plan that Georgian universities will take over later and run American Chemical Society certified chemistry degree programs independently in the future.

11.3.1 Minimum facility space requirements

These chemistry/biochemistry modern laboratories and facilities will allow Georgian students to gain hands-on experience in using many different modern instruments and study modern methods in chemistry and biochemistry. This is critical in training the workforce necessary for future biotech and hi-tech industries in Georgia including pharmaceutical companies. Students must be trained in order to get them ready to work at biotech companies from day one. Biotech and hi-tech companies expect our graduates to run and operate many major instruments that are routinely used at these companies. San Diego State University graduates are in high demand by local biotech companies in California because they receive excellent training. These assets will also allow not only ACS-certified bachelor's degree in chemistry/biochemistry in Georgia but also Biotech Certificate Programs in Georgia at different campuses including Tbilisi State University, Ilia State University, Georgian Technological University, and Tbilisi State Medical University.

The equipment needs for lower-division chemistry/biochemistry lab courses are relatively modest as compared to those for upper-division lab courses. Lower-division chemistry/biochemistry courses (Chem 200, 201, 202, 232, 251) only require relatively inexpensive small instruments including analytical balances, pH meters, simple spectrometers, rotovaps, ovens, gas chromatographs, UV-visible spectrometers, titration systems, etc. However, lower-division organic chemistry laboratory courses require a number of expensive chemical fume hoods.

Upper-division laboratory courses (Chem 417, 410A, 432, 427, 457 and 567) require more sophisticated and relatively expensive major instruments including NMR, GC-MS, LC-MS, HPLC, GC, FT-IR, lasers, oscilloscopes, Raman spectrometers, fluorescence spectrometers, differential scanning calorimeters, supercentrifuges, incubators, magnetometers, etc. In order to provide students with hands-on experience on using modern instruments and studying advanced instrumental methods of analysis, up to 5 stations of major instruments (e.g., 5 HPLCs) will be installed to accommodate 15-20 students per lab section. These upper-division laboratory courses require not only expensive major instruments initially but also adequate technical support staff to operate and maintain these major instruments so that the laboratory courses will run on schedule.

Computer Sciences facilities will be upgraded as outlined variously for GE, Smart-classroom requirements. Sufficient space has been budgeted according to course laboratory needs and project enrollment.

11.3.2 Evaluation of existing facilities

Based on observations during the October 2103 visit to Tbilisi, the existing laboratory facilities for science laboratories, especially chemistry and biochemistry laboratories, at Tbilisi State University, Ilia State University and Georgian Technological University are inadequate or nonexistent to teach modern chemistry and biochemistry laboratory courses. For example, the existing chemistry laboratories visited at Tbilisi State University are inadequately ventilated and chemical fumes far away from the labs could be detected. The laboratories at Ilia State University are also inadequately ventilated. Even the labs that were refurbished recently with support from EU Tempus grants were inadequately ventilated. In fact, most labs only have one or two chemical fume hoods and these are simply vented outside the windows, posing dangerous safety issues for other occupants of the building especially those upstairs. All existing laboratories must be remodeled with adequate ventilation systems that meet safety standards for SDSU faculty teaching in Georgia. It may be more cost effective to build new labs with adequate fume hoods from ground up that are dedicated to chemistry/biochemistry laboratory courses. Furthermore, many of the laboratories visited did not have an adequately clean air handling system that is required for many expensive major instruments planned for acquisition and installation for upper-division laboratory

courses (e.g., nuclear magnetic resonance, mass spectrometry, chromatography, etc.). The existing labs do not have many modern instruments many major instruments are planned.

11.3.3 Travel Costs

Determination of faculty needs during implementation and operation have taken into account the following factors:

1. Course requirements
2. Status of Georgian partner institution curriculum
3. Status of Georgian partner institution faculty
4. Projected enrollments

Based on the course requirements, enrollment, and preferred teaching modalities, travel and other costs have been computed on a per-student basis and incorporated into the budget estimates.

11.3.4 Rehabilitation needs

All existing laboratories must be remodeled with adequate ventilation systems that meet safety standards for SDSU faculty teaching in Georgia. It may be more cost effective to build new labs with adequate fume hoods from ground up that are dedicated to chemistry/biochemistry laboratory courses. The existing labs do not have many modern instruments many major instruments are planned.

11.3.5 Identification of existing equipment

The existing labs do not have many modern instruments many major instruments are planned.

11.4 Future Programs Compact Year 3 – Civil/Construction Engineering

Dr. Ken Walsh, Chair of the SDSU Civil, Construction, and Environmental Engineering Department, was part of the Institutional Leadership Team and participated in the site visit to ensure accurate evaluation of the facilities and technical capabilities of the Partner Institutions. Requirements for the Civil and Construction Engineering programs are based upon his evaluation as well as input from partner institutions. Facility space requirements for labs are indicated in the budget spreadsheet, along with some indication of storage and administrative space. The Civil/Construction Engineering program will require access to 6 classrooms with space for our 30 students, and at least 2 classrooms with space for up to 100 students for courses to be taught in large sections. All classrooms will require smart podiums that will accommodate two projectors and two computers - one to run/show faculty in US, one for a local projection of the materials at the Partner Institution. This will support courses taught in both hybrid and online modalities.

Some classrooms at Ilia State University are in good conditions for large sections. Most classrooms visited and evaluated have sufficient projector and podium, but will need some upgrade.

Georgia 2020 and Ilia State University are proposing the construction of a new building. As such, based on the assessment of the physical infrastructure available at Ilia State, new physical infrastructure is needed. Space will comply with US Building and fire safety codes and SDSU standards, and applicable ABET/ACS requirements as well as parallel standards of the Republic of Georgia.

11.4.1 Minimum facility space requirements

Facility requirements for the Civil/Construction Engineering programs include classroom space, multi-purpose computer laboratories, and traditional physical laboratories for hydraulics, geotechnical engineering, environmental engineering, structural engineering, administrative support, and storage. A

surveying laboratory including storage space for the surveying equipment used will also be constructed for these programs.

Classroom needs for the programs includes access to approximately six classrooms with space for 30 students in each, and approximately 2 classrooms with space for 100 students in each. This number of classrooms is predicated on the assumption that the spaces can be shared between all the engineering programs at Ilia State University. This number will also provide the ability to schedule multiple courses simultaneously. These facilities are critical for this program in order to support the use of these classrooms during the time windows where work times reasonably overlap between Tbilisi and San Diego. Each classroom should be outfitted with a smart podium, to include Macintosh and Windows computers, laptop hookups, a document camera, and VCR/DVD. All classrooms should be outfitted with sound systems, to include microphones. These classrooms should also be outfitted with two projectors integrated with the equipment in the podium, to allow projection during instruction. They should be individually configurable, to allow one of them to depict a video image with a white board and the other to depict a screen capture, when used for hybrid and online courses.

11.4.2 Evaluation of existing facilities

Ilia State University does not currently maintain laboratories for the Civil/Construction Engineering programs. These facilities will have to be developed as part of the compact. Classroom facilities may already exist, but will require enhancement of the smart technology as indicated in above.

11.4.3 Travel costs

Determination of faculty needs during implementation and operation have taken into account the following factors:

1. Course requirements
2. Status of Georgian partner institution curriculum
3. Status of Georgian partner institution faculty
4. Projected enrollments

Based on the course requirements, enrollment, and preferred teaching modalities, travel and other costs have been computed per student and incorporated into the budget estimates.

11.4.4 Rehabilitation needs

Laboratories to support the Civil/Construction Engineering programs are further described here. For each laboratory, equipment has been designed to support student learning of design of experiments and also of the specific concepts to be analyzed. Student learning will be enhanced by the preparation of laboratory reports to describe the experiments conducted and the related physical phenomena, along with calculations to demonstrate student knowledge of the various theories being demonstrated. All laboratories will be sized to support up to 25 students in a single section.

Hydraulic Engineering Laboratory: This laboratory will provide hands-on experience with the behavior of water as an engineering material. This laboratory will support undergraduate courses in hydraulic engineering, hydrology, and open-channel flows. Laboratory experiments can be conducted to give the students experiential learning with regards to continuity and momentum, pressure pipe flows, flows through orifices, weirs, and flow measurements, and hydrographs. Later classes can conduct experiments relating to pipe networks and hydraulic equipment (turbines and pumps).

Geotechnical Engineering Laboratory: This laboratory will provide hands-on experience with the behavior of soil and aggregate as engineering materials. The laboratory will have the necessary

furnishings and equipment to support laboratory sessions related to visual and formalized mechanical identification of soil types, measurement of plasticity, compaction, density, water content, water flow characteristics, volume change, and a range of soil strength measurements.

Structural Engineering Laboratory: This laboratory will provide hands-on experience with structural materials and elements commonly used in structures. Laboratory experiences will include a number of tests of material strength, including tests on steel and other structural metals. In addition, this lab will include a materials laboratory in which tests can be conducted on a range of mixed materials such as concrete and asphalt, to include both strength and quality control testing. The laboratory will support both lower division introductory needs in material and solid mechanics, along with upper division construction materials and structural mechanics needs.

Environmental Engineering Laboratory: While the preceding laboratory spaces are intended for installation at Ilia State University, the Environmental Engineering laboratory will be located at Tbilisi State University. The laboratory will be co-located with the Chemistry and Biochemistry laboratories to allow these two programs to share equipment. The laboratory will provide hands-on experience with the conduct of testing commonly conducted as a part of the design and operation of water and wastewater treatment facilities.

Surveying Laboratory: The laboratory will be conducted outdoors; in fact, because of space requirements and the demands of practice it should not be conducted in an interior space. Laboratories will provide hands-on experience with measurements of distance and angles and construction layout, and will include an understanding of the use of chains, levels, and total station equipment along with good practice for field documentation.

11.4.5 Identification of existing equipment

Existing equipment is very limited and, because these degrees are not yet offered by Ilia State University, no equipment is currently available for most of these laboratories.

12 Task 6 – Develop a five-year financial plan for use of initial MCC investment fund

Key to the overall budget plan is the appropriate distinction between one-time funds (e.g., MCC investment funds), to be used for one-time developmental and facility expenses, and sustained revenue (e.g., Government of Georgia contribution, tuition, self-support revenues) available for operations and long-term instructional expenses.

12.1 Task 6a – Facilities Rehabilitation and Furniture and Equipment

Georgia 2020 will rehabilitate approximately 29,750 sq. ft. and construct approximately 11,500 sq. ft. of teaching and laboratory space for the priority use of Georgia 2020 students and programs. Both the rehabilitation and construction will meet local and international standards for educational facilities and meet MCC and IFC guidelines.

Responsive to Technical Evaluation Panel comments relevant to review criterion 6, SDSU engaged Saunders Group Infrastructure Consultants in Tbilisi to secure accurate inspection and evaluation and cost estimates for the refurbishment and new construction. The Saunders Group report is included as part of this proposal for review.

All laboratory rehabilitation is tied directly to required courses, and is scheduled to be complete one calendar year in advance of the teaching need for those laboratory spaces.

Space rehabilitation costs are based on the estimates provided by Saunders Group, and average ~$200/m^2 for renovations and $1,175/m^2 for new construction. All renovation, construction and furniture and equipment costs are supported by a 10% reserve for pricing adjustments depending on market conditions.

Furniture and equipment costs are calculated on a per unit basis with detailed equipment lists submitted according to the laboratory space outlined in Appendix 20.

In general, the investment strategy focuses on the refurbishment of space first, ensuring adequate power, water, gas, ventilation, and furnishing and equipping immediately prior to the teaching needs. The sequenced approach mitigates the challenges of simultaneously refitting and purchasing and installing furniture and equipment and allows for a natural progression of development.

12.1.1 Electrical Engineering (Refurbishment at Tbilisi State and Georgian Technological)

Compact Year 1 – Renovations for the Electrical Engineering program in CY 1 include Laboratory 1 (EE210L, 330L, 430L), required computer classroom, smart classroom, upgrades to two lecture halls, development of a Digital Media Center, laboratory storeroom, technician and program offices, and required common spaces and facilities.

Compact Year 2+ – Renovations for Digital Communications, Senior Design, Antenna-Microwave, and Power Electronics laboratories will be delayed under CY2 – appropriate to completing the labs one calendar year before needed for teaching. Furnishing and equipping is scheduled to be completed one semester in advance of the teaching requirements. Detailed descriptions of the required furniture and equipment are included in theThis strategy is consistent with the recommendations of the Technical Evaluation Panel and allows for a natural sequence of retro-fitting.

Maintenance and Refresh – Georgia 2020 has created a business model that is strong in retaining resources for program sustainability, maintenance and refresh of equipment. This model is vital to be responsive to the long-term (20-year) goals of the initial investment. Furniture, equipment and supplies refresh is appropriately budgeted in the Program Operations, not in the MCC Investment.

12.1.2 Computer Engineering (Future Program CY 3 – Civil/Construction Engineering) New Construction at Ilia State University

Compact Year 1 – All construction will be launched during CY1. Computer Engineering courses planned for Ilia State laboratories include CompE 270, 375, 470. The first required course, CompE 270 is scheduled for Semester 3, however, similar laboratories could be leveraged at Tbilisi State University for this course if there are unforeseen delays in construction. The timing of construction is matched to have complete facilities one calendar year before the need for the facilities. The Civil/Construction degree program will only begin enrolling students in CY3, and the facilities should be fully functional as needed.

Compact Year 2+ - Furnishing and equipping is scheduled to be completed one semester in advance of the teaching requirements. Detailed descriptions of the required furniture and equipment are included in Appendix 20. This strategy is consistent with the recommendations of the Technical Evaluation Panel and allows for a natural sequence of retro-fitting.

12.1.3 Applied Sciences (Chemistry and Computer Sciences – Refurbishment at TSU and GTU)

Compact Year 1 – Refurbishment of lower-division and General Educational laboratory spaces will begin immediately in CY 1 to prepare for instruction in CY 2. Chemistry, GE, Environmental Chemistry, and Chemistry 232 and 432 laboratories will be refurbished. In addition, required computer classrooms (2), smart classrooms, lecture halls, laboratory store rooms, and technician and program offices will be renovated.

Responsive to Technical Evaluation Panel comments relevant to review criterion 1, complete renovations have been spread between the initial years of the compact to allow for the recommended focus of efforts on initial facilities and programs.

Compact year 2 – Space preparation for Chemistry laboratories for Chem 417, 427, 457, Chem 457 (special instrumentation) and Chem 567 will launch in CY 2, well in advance of the requirements for these teaching spaces, but allowing for initial focus on the required GE and lower division teaching laboratories. Furnishing and equipping is scheduled to be completed one semester in advance of the teaching requirements. Detailed descriptions of the required furniture and equipment are included in Appendix 20. This strategy is consistent with the recommendations of the Technical Evaluation Panel and allows for a natural sequence of retro-fitting. In each case, the estimated cost for the equipment and materials was included. A budget for computers, software (recurring), laboratory supplies (recurring), audio/visual systems, and furnishings for offices, classrooms and laboratories is included. A reserve for additional items/pricing adjustments, etc. of 10% of the budget for each Program is proposed and budgeted.

12.2 Task 6b – Program Development Costs

Program Development costs are similar across all three programs, and so will be described as common costs. Differential expenses and budgets within the programs can be attributed to variations in the projected enrollment, and the subsequent impact on faculty needs or per-student expenses.

12.2.1 Faculty Development

Georgian faculty designated to teach an SDSU course or laboratory session will participate in an orientation session at SDSU prior to the target course being offered in Georgia. These sessions may be conducted either during the summer or academic semester, depending upon the course. The budget for this item, Faculty Development, is based on the number of Georgian faculty/instructors listed on the Finalist Program Operations Spreadsheet for each program and for each Compact Year. The cost estimate includes cost of travel, per diem, and related expenses over an average 75-day period for each Georgian faculty participating in the program. During the orientation period we anticipate that regular salary compensation will be provided by the Georgian university where the faculty member is employed.

12.2.2 Curriculum Development

Online Course Development – It is projected that there will be some need and opportunity to improve online course delivery both to augment the General Education requirements and to prepare for the introduction of new programs. Online course development funds will be used on a limited basis for the development of stand-alone asynchronous courses, and rather, will be focused on developing effective hybrid-delivery systems where there may be synchronous lectures and question periods, face-to-face faculty support in Georgia, as well as intensive sessions with SDSU and Georgia faculty together in Georgia.

Curriculum Articulation – A major opportunity for accelerating the ABET accreditation process is to identify, modify (where needed) and accept for credit existing courses at the partner institution. The full evaluation and articulation assessment will be collaboratively developed and supported either directly at SDSU, or via ABET accredited curriculum assessment contractors. Funding under this line item may also be used to accelerate the approval and authorization by the Georgian Government to list the Georgia 2020 programs as authorized programs in the national university system.

12.2.3 Student Recruitment/Outreach

Outreach and recruitment will be a major effort for the effective launch of the program. Appropriate recruitment staff are budgeted elsewhere, but this funding will be used to support the initial investment of recruitment and marketing materials, support of additional staff on a part-time basis as needed, and investments that may leverage other outreach activities currently ongoing in Georgia (e.g., Delta Systems K-12 programs).

12.2.4 Library and Resource Information Costs

Library facility improvements are also included in the MCC investment, but as part of Program Development, database resources, licenses, rapid connections and access to existing SDSU electronic resources will be launched and supported during CY 1,2. Future requirements are budgeted on a per-student basis under the Finalist Program Operations budget. The MCC investment will be used to kick-start access to these required resources in advance of tuition support.

12.2.5 ABET Accreditation

Per SDSU's experience, ABET Accreditation can be a lengthy and costly process, in addition to the fundamental instructional and research improvements to be made. Because accreditation is a key objective of this program, appropriate funding has been budgeted under the Program Development process to support additional ABET review of program improvements, as well as the funding necessary for formal entry into the accreditation process. These funds may also be used as needed for external accreditation reviewers or consultants to improve the partner institutions preparedness for the accreditation process.

12.3 Task 6c – Travel Costs, Scholarships, Other Direct Costs and Overhead

12.3.1 Travel Costs

Periodic (quarterly) visits by senior SDSU administrators throughout the program to conduct onsite reviews, discussions with partner institutions, and other activities to ensure the program is advancing as intended will be supported. During the first 2 years, travel costs of key personnel responsible for ensuring that the key facilities (laboratories, smart classrooms, etc.) are set-up, outfitted, and completed as needed and in time for use in scheduled classes will be funded. The travel budgets are based on current roundtrip airfares, per diem rates, and other miscellaneous travel costs.

12.3.2 Scholarships

Scholarships are an important component of enabling student success and participation in the Georgia 2020 program. Substantial scholarship support is included in Program Operations, as it will be an ongoing cost for the long-term sustainability of the program. To facilitate access, recruitment and enrollment, especially of socially-disadvantaged students, the investment funds preserve subsistence scholarships to defray the costs of rural students that may need to relocate to Tbilisi to participate in one or more of the preparatory programs offered by Georgia 2020. Scholarship support is available for up to 25% of the projected enrollment on a per program basis.

12.3.3 Other Direct Costs

This expense serves an important investment purpose. As indicated elsewhere in the budget, programmatic expenses are incurred immediately upon the launch of the program. However, program-based revenue (e.g., tuition and GoG support) does not begin until students are enrolled and taking courses. To support the initial program launch expenses, MCC investment is expensed here, and added as initial revenue where needed to balance immediate programmatic expenses.

12.3.4 Overhead

Across-the-board overhead rate on both programmatic and investment funds are based upon 26% of Modified Total Direct Costs. This is the approved off-campus program rate, which provides for institutional administrative costs, This rate is substantially less than the Federally approved overhead rate for SDSU. These administrative costs can be broken down into four major categories:

General Administrative Costs, Academic Departmental Administrative Costs, Sponsored Administration Costs, Student Services Administrative Costs.

General Administrative costs include such things such as Business and Financial Affairs, Human Resources, Payroll, Accounts Payable, Purchasing, Business Information Systems, etc.

Academic Departmental Administration costs include such things as Academic Affairs, Instructional Technology Services, and academic department administrative support within the individual academic departments and colleges.

Sponsored Administration costs include such things as Pre-award sponsored development and post-award sponsored program administration as incurred by the Research Foundation.

Student Services Administration costs include such things as Student Admissions, Student Records, Student Affairs, Financial Aid, Career Services, etc.

Within each of these categories, the largest individual cost element is Salaries/Fringe Benefits of the personnel performing these functions. Other cost elements include equipment, supplies, travel, telecommunications, training, maintenance agreements, and other operating expenses.

The full approved overhead rate for off-campus instructional expenses is 77.6%.

In response to the Technical Evaluation Panel comments relevant to review criterion 11, the reduced overhead rate applied to this proposal by SDSU represents an institutional investment with regard to the MCC budget of $4,798,832 worth of foregone costs.

13 Task 7 – Cross-Cutting Costs

Cross-cutting costs were assigned proportionately based on student enrollment in novel Georgia 2020 programs and the continuing programs offered by the partner institutions. Assets and resources will benefit partner university students enrolled in related programs, but Georgia 2020 students will have priority use of the facilities and equipment provided by this project.

13.1 Facilities Maintenance

Space costs were established on a per square foot basis by examining projected renovation and construction plans and applying a collaboratively generated cost accounting for existing SDSU costs, and data from the partner institutions.

13.2 Equipment Operations and Upkeep

Equipment and operations uses a standard 20% depreciation rate for five-year life of equipment, based on a percentage of original purchase price. This reflects the expected lifetime of typical science, engineering, and computer equipment used for university teaching.

13.3 Utilities

Utilities were based directly on current Republic of Georgia costs, normalized for consumption of equivalent laboratories presently in operation in San Diego.

13.4 Other Cross-Cutting Costs

Joint administrative responsibilities, Library Resources, and Student Life opportunities were assigned costs proportionate to projected enrollment.

14 Task 8 – Project Year 7 Financial Plans for Partner Strengthening

The Georgia 2020 methodology leverages the existing infrastructure at the partner institutions and implements a currently accredited curriculum consistent with the initial ABET review report recommendations to not expend funds to review/enhance the existing curriculum at the partner institutions. By simultaneously upgrading the physical assets and infrastructure and upgrading the international recognition of the initial partner institutions, those institutions will be in good standing to continue to expand the impact of their own programs once transitioned to full ABET accreditation.

In addition, the direct collaborative approach proposed here takes advantage of the ABET-Foundation-recognized strengths while adding targeted improvements recommended for rapidly achieving ABET accreditation. While the existing state of the partner institutions make them ideal partners for the rapid implementation and execution of the proposed programs, the general implementation-evolution-transition methodology proposed here could be applicable to any of the programs reviewed by the ABET team, or any future Georgian partner institutions that may choose to participate.

During the in-person visits made to potential partner institutions, the SDSU Institutional Leadership visited as many Georgian universities as possible, including (in addition to the current partner institutions) Georgian Technological University, Tbilisi State Medical University, the Eliava Institute, and the Lugar Center for Public Health Research.

Georgia 2020 has developed a long-term financial model that allows for maximum flexibility, substantial contingency funding, and direct re-investment into new programs. Because Georgia 2020 leverages existing infrastructure while implementing ABET-accredited curricula, other Georgian partner institutions will be included in the future expansion as the project moves from the start-up phase to address key objectives such as access of rural and socially disadvantaged students, for which institutions outside of Tbilisi may be key partners.

Responsive to Technical Evaluation Panel comments relevant to criteria 10 and 11, the annual “residual” has been increased beginning in CY4. Securing long-term funding for new faculty and services for students must be balanced with an appropriate tuition. Although the Technical Evaluation Panel tacitly approved the appropriateness of the proposed tuition under the Interim Proposal, the leadership of the partner institutions expressed some concern about tuition levels. In recognition of this challenge, the Final Proposal tuition has been decreased and scholarship funding has been increased. However, core to the responsiveness of the section is that the modeled residual has been secured for four priority uses: (1) Establishment and development of new degree programs using the successful Georgia 2020 development model – disciplines to be determined in collaboration with partner institutions based on

capacity and demand; (2) Construction of new facilities to allow for program expansion; (3) Upgrading equipment and facilities to course offerings up to date; (4) Continuing student scholarship aid to ensure long-term access for socially-disadvantaged student groups. Category four retains the opportunity to re-invest residual funds in continuing to improve access for students currently unable to pay the tuition. This is a successful model employed at SDSU, where many students have no out-of-pocket tuition expenses based on a combination of merit and needs-based scholarships. If all direct expenses are covered, and residual funding persists, the Georgia 2020 Advisory Board will be responsible for recommending other reinvestment opportunities that will be pursued.

In addition, the Georgia 2020 program recognizes the continued need of the partner institutions to secure resources for their own development in pursuit of ABET accreditation and general program improvement. To that end, the long-term financial plan provides for approximately $250,000/year to be distributed among the partner institutions for continuous program improvement via faculty hiring, facility upgrades, doctoral fellowships or other strategic initiatives. The Georgia 2020 Advisory Board will evaluate and recommend appropriate distribution of these resources based upon need, opportunity, and strategic impact.

15 Task 9 – Financial Plan for Finalist Degree Program Operations

15.1 Revenue

Revenue is generally driven by enrollment projections. However, Georgia 2020 will employ an innovative mitigation strategy to leverage both MCC-Investment and GRDF investment to cover approved expenses – Administrative start-up and scholarships, respectively – during the start-up period when no revenue is projected. Tuition has been set in consultation with the partner institutions, and reflects comments from the Technical Evaluation Panel and in-country market evaluation. Of primary importance is to maintain a tuition cost that both allows for broad access and ensure long-term sustainability of the program. In recognition of the requirement to provide broad access, and responsive to the comments of the partner institutions, the proposed tuition has been reduced to $7,500. Substantial scholarship funding has also been provided, and is described below. This tuition represents a competitive rate for regional private institutions, many which do not provide accredited degrees. The value of the accredited degree – allowing for recognition of educational accomplishment internationally – is deemed of sufficient worth to warrant this tuition. In addition, despite the benefit of project operating reserves in the later years of the Compact, these funds are required to hedge against unforeseen contingencies, and be leveraged for the long-term investment strategy beyond the life of the Compact. Finally, SDSU typically charges additional fees for student life, library access, and supplies needed for the laboratory intensive degrees and courses proposed. Under the Georgia 2020 program, all student fees are incorporated into the proposed tuition, with services comparable to those available to on-campus students at SDSU.

15.2 Salaries

Finalist program operations support salary for Home Campus faculty to participate in the capacity building activities of the program. Salary costs are driven by the requirement for faculty as stipulated by the preferred teaching modality and training requirements. The initial degree programs will transition to Georgian faculty as they demonstrate capacity, however SDSU faculty engagement is preserved to CY7 and beyond to allow for the development and implementation of new programs. New program resources will be allocated under consultation with the Advisory Board, and released pending documented progress on ABET-accreditation for the original programs.

Finalist program operations also support all finalist program administration, including administrative staff at the partner institution campuses. These costs are incurred immediately, but not supported until students are enrolled, and therefore are initially defrayed by MCC Investment – represented as a $1.8M transfer in CY1, and a $900k transfer in CY2. After that, tuition is sufficient to support the proposed program operations.

15.3 General Operations

The General Operations budget covers Student Recruitment, Library, and Student Life programs. These programs have been budgeted on a per-student basis. Student recruitment is budgeted to include student evaluation and preparatory institute costs (exclusive of preparatory faculty costs, which are budgeted separately under Salaries). These costs, as student support, are appropriately covered initially by GRDF allocation. After CY7, it is projected that the need for extensive student preparation may decrease as companion primary school development programs, and improved primary English language training take hold.

Library and Student Life costs are calculated on a per-student basis and grow with the project enrollment. These funds will be reinvested in student development in the form of career development, speakers, mentors and aides.

15.4 Capacity Building

Capacity building is budgeted under the Finalist Program Operations to provide out-year funding in support of new program development, and the required resources and faculty training to realize many of the notional goals for certificate programs and/or graduate programs in collaboration with Georgia Research institutes not part of the initial proposed partnership.

Beginning in CY5, after substantial faculty development progress has been made in the initial degree offerings, funding is preserved to host additional Georgian faculty in new disciplines, advance the scholarship of Georgian doctoral students as a tool to facilitate local professorial talent, and substantial funding to identify, develop and implement industry specific certificate courses responsive to the market needs at the time.

15.5 Travel Costs

Travel costs are budgeted to support the presence of SDSU faculty under the required teaching modalities to ensure accredited course delivery during the Implementation phase of the program. SDSU salaries are budgeted separately to account for appropriate compensation to the individual and the participating department. Travel costs include airfare, per diem, and miscellaneous costs that support an engagements that vary from 16 days in support of intensive instructional periods to 100 days covering a full semester of Co-instruction, as described in the appropriate modality.

15.6 Scholarships and Financial Aid

Sufficient scholarship aid is budgeted to support up to 25% of the student body in any given enrollment year with an average merit or needs-based scholarship of approximately $4,000, with an additional $1,000 student aid grant to be used for living expenses. In particular, the living expenses grant is viewed as an innovative and culturally appropriate approach to facilitating the participation of rural and socially-disadvantaged students that may encounter greater logistical obstacles with attending the university in Tbilisi. Scholarship aid tracks with projected enrollment to preserve the 25%/$4,000 + $1,000 capacity.

Although scholarship aid is budgeted according to the bulk estimates described above, based on student merit and the participation and demonstration of financial need, individual students may be designated

as eligible for more or less than the $4,000 average award. Similarly, national examination and other merit criteria combined with the demonstrated need of students may allow for greater than 25% of the enrolling student body to receive some level of aid (although at a total average level that would be, by necessity, lower than the projected $4,000/student).

The current scholarship budget allows for maximum flexibility, and determinations to be made during the enrollment period based on the performance and composition of the incoming class.

As described elsewhere, because scholarship aid is designed to be part of the long-term sustainability of the program, substantial scholarship aid is supported by the revenue model of the program. The GRDF investment funds are heavily leveraged in CY2 and CY3 to support the start-up costs of the scholarship aid in advance of sufficient revenue. GRDF will continue making investment of $200,000/year for CY4 and CY5. As described elsewhere, net program operations will be leveraged past CY5 as appropriate to maintain sufficient student support levels appropriate to the cultural and economic climate.

15.7 Other Costs

The full, Federally-approved overhead rate for off-campus instructional expenses is 77.6%. However, Finalist Program Operations are proposing to recover only 26% of Modified Total Direct Costs. These administrative costs can be broken down into four major categories:

General Administrative Costs, Academic Departmental Administrative Costs, Sponsored Administration Costs, Student Services Administrative Costs.

General Administrative costs include such things such as Business and Financial Affairs, Human Resources, Payroll, Accounts Payable, Purchasing, Business Information Systems, etc.

Academic Departmental Administration costs include such things as Academic Affairs, Instructional Technology Services, and academic department administrative support within the individual academic departments and colleges.

Sponsored Administration costs include such things as Pre-award sponsored development and post-award sponsored program administration as incurred by the Research Foundation.

Student Services Administration costs include such things as Student Admissions, Student Records, Student Affairs, Financial Aid, Career Services, etc.

Within each of these categories, the largest individual cost element is Salaries/Fringe Benefits of the personnel performing these functions. Other cost elements include equipment, supplies, travel, telecommunications, training, maintenance agreements, and other operating expenses.

In response to the Technical Evaluation Panel comments relevant to review criterion 11, the reduced overhead rate applied to this proposal by SDSU represents an institutional investment with regard to the MCC budget of $4,798,832 worth of foregone costs.

SDSU is proposing to accept this reduced rate as a demonstration of the institutional commitment to program, and to maintain consistency with the approved rate for the MCC Investment funds, which is 26%.

16 Task 10 – ABET Assessment

Conduct as assessment of readiness for ABET accreditation for proposed programs using ABET criteria for accrediting engineering programs as a guide.

The ABET Foundation, under contract with MCA-Georgia, has provided information relative to the readiness of STEM programs at public Georgian universities for a review by ABET for possible program accreditation. The ABET Foundation selected five programs at Georgian public universities among the disciplines of agricultural engineering, civil engineering, computer engineering, computer science, and electrical engineering for an intensive review and evaluated the actions that would be needed to prepare the programs for an ABET review.

Based upon visits, discussions, and review of available documentation, the evaluation of the SDSU Institutional Leadership team closely agrees with the findings of the ABET review team, especially, of the selected partner institution programs. Programs at these institutions were recognized for being current, with basic strengths and processes for continuous improvement. Following earlier site visits by Deans Stanley Maloy and Paul Wong, the SDSU STEM leadership team visited three universities in the Republic of Georgia during the week of September 28th, 2013 – October 4th, 2013: Ilia State University, Tbilisi State University, and Georgian Technological University. The STEM leadership team included Stanley Maloy, Ph.D. (Dean, College of Sciences and Professor of Microbiology), Alan Sweedler, Ph.D. (Assistant Vice President for International Affairs and Professor of Physics), William Tong, Ph.D. (Chair, Chemistry and Biochemistry Department), Lal Tummala, Ph.D. (Chair, Department of Electrical and Computer Engineering), and Ken Walsh, Ph.D. (Chair, Department of Civil, Construction, and Environmental Engineering). The team visited university facilties and spent many hours with the faculty discussing the programs and courses offered at each university. The team also requested documentation related to the course outlines and faculty resumes.

In addition, SDSU hosted senior leadership from the partner institutions from January 27-29, 2014 to further clarify the interests and capabilities of the partner institutions vis-à-vis their existing degree programs.

Based on the personal visits to these universities and the documents submitted by these universities, none of the programs are at a sufficient level for accreditation by ABET at this time, a perspective supported by the preliminary evaluation performed by the ABET review team. The goal is to make these programs viable for accreditation in the future, but for now, to meet the immediate need to increase the number of STEM graduates necessary for the economic development of the country SDSU will offer the existing accredited degree programs in parallel with the universities in Republic of Georgia.

ABET criteria are extensive, and fully independent, duplicate, assessment according to the ABET criteria is beyond the scope of this proposal. However, the Institutional Leadership Team concurs with the identification of a required set of actions that is the same for all proposed programs:

- the definition of appropriate student outcomes for the program,
- the implementation of effective assessment mechanisms that provide data on the extent to which each outcome is attained by students,
- the implementation of an effective process for evaluating the assessment data to determine the attainment level by students for each outcome relative to the target level,
- the implementation of a continuous improvement process that uses the results of the evaluation of assessment data as input,

- the establishment of the implemented mechanisms and processes in a planned, periodic manner, and
- the documentation of the assessment, evaluation, and continuous improvement process and their results.

In Response to the Technical Evaluation Panel comments relevant to review criterion 1, SDSU maintains accreditation in all the proposed degrees and is an active partner with ABET and ACS (the two accrediting organizations relevant to the proposed degrees) in a process of continuous improvement not only to maintain accreditation, but also to regularly improve student learning and student capacity to enter the job market in their chosen fields.

The proposed curriculum is the accredited SDSU curriculum, with no modifications. In all cases, learning assessments are consistent with accreditation requirements and consist of a mix of direct and indirect assessments, with appropriate measurement tools. For example, direct assessment includes homework, examinations, class discussion and projects. Indirect Assessment includes qualitative student surveys that assist in adjusting the pace and focus of class lectures and homework, ensuring adequate progress and full compliance in learning outcomes for the students. The required culminating design experiences offered via capstone courses provide a key direct assessment opportunity at the threshold of completing the degrees. Additional direct and indirect postgraduation assessments provide a means of ensuring continued relevancy of the degree offerings to the needs of industry.

Responsive to the Technical Evaluation Panel comments relevant to review criterion 1, the panel is directed to the specific and detailed program evaluation metrics and methodologies included in the Appendices (15-17).

17 Task 11 – Governance and Administration

For each program proposed (including both Finalist and Georgian Partner Institution degree programs), develop a governance and administration plan that addresses the following:

17.1 Task 11a – Current Georgian Partner Institution Governance Structure and Procedures

As part of the proposal planning process, the SDSU Institutional Leadership and Development team solicited input from our partner institutions and thoroughly evaluated existing and planned curricula in the target disciplines. This process included multiple visits to the partner universities with tours of laboratory facilities and in-person discussions between faculty, discussions via SKYPE, numerous email communications, and an intensive working trip sponsored and hosted by SDSU January 27-29, 2014. The table below outlines the Georgian Delegation that participated in this planning conference.

Georgian Technological University	
Dr. Nikoloz Abzianidze	Professor Faculty of Power Engineering and Telecommunications
Dr. Alexander Milnikov	Professor Computer Technologies and Engineering/Informatics
Ilia State University	
Dr. Mikheil Elasvili	Dean of the School of Engineering
Dr. Gigi Tevzadze	Rector
Tbilisi State University	
Dr. Ramaz Botchorishvili	Dean, Exact and Natural Sciences

Dr. Marine Chitashvili	Vice Rector
Dr. Nino Inasaridze	Executive Coordinator
Consultant	
Dr. Nino Chubinidze	Expert in quality assurance and Georgian accreditation

As indicated in table, designated Georgian partner institution leaders have been consulted on the design and proposed implementation of the program. Students will continue to pursue relevant degrees with Georgian partner institutions under the criteria established for each program, and those students who become a part of the Georgia 2020 degree programs will also be considered SDSU students and be subject to the rights and responsibilities of being a U.S. student in an accredited degree program. Faculty and space assignments will be developed collaboratively according to normal academic processes, but Georgia 2020 will retain priority use of spaces refurbished or constructed with MCC investment.

17.2 Relationship between Finalist degree program and Georgia partner institution programs

Initially, the programs will operate in parallel as sister degree programs utilizing different educational methodologies and processes. Existing partner programs will continue to enroll students and low or no out-of-pocket expenses, which will differentiate the motivations of the relative student bodies. As Georgian faculty become more familiar with ABET accredited teaching and evaluation models, they will be encouraged to leverage those processes for the partner institution programs. As described in earlier sections, this evolution will be necessary to advance the institutions' preparations for accreditation.

17.3 Relationship of the Finalist degree programs to each other

The finalist degree programs are housed under two SDSU colleges: the College of Sciences, the College of Engineering. The College of Arts and Letters will play a primary role in General Education and language training. These three colleges regularly collaborate on academic programs.

The entire Georgia 2020 program will be under the leadership of a single Dean, advancing the curricula as consistent with existing SDSU requirements. The degree programs will share facilities as needed, and natural relationships and space sharing plans have already been established for, for example, Electrical and Computer Engineering, and Civil/Construction Engineering and Chemistry with regard to shared needs for the Environmental Chemistry laboratory.

17.4 Consortium relationships

The execution of the program will require secure and defined relationships between SDSU and MCA-Georgia, between SDSU and the partner institutions, and among the partner institutions in Georgia.

First, SDSU anticipates establishing a partnership agreement to facilitate funding for the program through a contract with MCC/MCA. SDSU, along with their auxiliary Research Foundation, has broad and deep experience in a variety of contract and grant agreements including cooperative agreements, cost-reimbursable contracts, grants, and other forms of financial research and educational support. SDSU and its Research Foundation has the financial capacity, working capital, and other resources to perform the work as proposed under the contract without assistance from any outside source. For example, the Research Foundation receives approximately 800 new awards each year, and it advances start-up and operating funds as part of its normal course of business. At any one time, as much as $20 million in expenditures are recorded as accounts receivable from various sponsored programs. Also, the Research Foundation, as a non-profit auxiliary for San Diego State University, has its annual A133 audit performed by an agency of the U.S. Department of Health and Human Services.

The final form contract will require both SDSU and in-country legal counsel review prior to entering into the contract. Specific areas of legal research and negotiation will include, but are not limited to, how to best comply with requirements including employment law related to hiring Georgian citizens an long-term working relationships for SDSU faculty and staff, reporting of foreign bank and financial accounts, nonprofit status, applicable personal and value-added tax law, compliance filings, and export control compliance. SDSU will not own any land, buildings, facilities or equipment, but will need access to all relevant facilities and equipment to fulfill the intent of the contract.

In parallel with the contract negotiations with MCC/MCA, SDSU will engage the partner institutions to formalize relations anticipated under the existing MOUs and successful collaboration to-date. We emphasize that SDSU and the partner institutions have worked closely and effectively in good faith to generate the Inception, Interim, and now Final Proposals. This collaboration has involved multiple delegation trips and constant electronic contact. The overarching agreement will be structured as a multi-party Articles of Collaboration, with specific rights and responsibilities governed by targeted sub-agreements that may have the form of sub-contracts, lease agreements, access agreements, or other relevant documents as appropriate.

Of critical importance is the establishment and recognition of the Board of Advisors – a collaborative management group with representation from the major partners and important industry and research stakeholders in Georgia. The Board of Advisors will guide the long-term strategic development of the program and will form the cornerstone of a collaborative process to negotiate resolutions that meet the needs and objectives of all the partner institutions.

17.5 Relationship between the Finalist degree programs and the Finalist home campus

Degree programs for Georgia 2020 will have the same status as SDSU home campus degree programs. Programs will be periodically reviewed and critiqued according to established practices at SDSU. The criteria for faculty recruitment will be based on standards that have been established at SDSU for the STEM disciplines and for general education courses required for graduation and for ABET/ACS accreditation. Annual reviews of faculty performance will be undertaken to assess the quality of faculty teaching, research, and service.

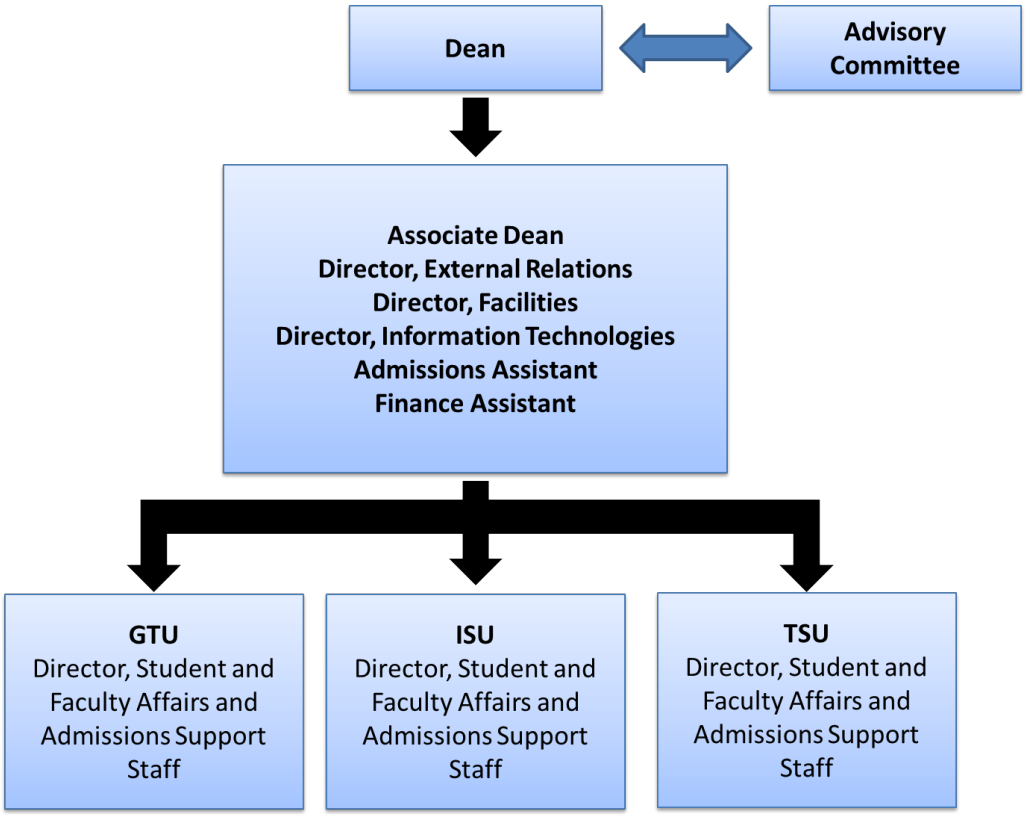
17.6 Non-program-specific administrative and support staff

Responsive to the Technical Evaluation Panel comments relevant to criterion 4, Georgia 2020 has added substantial central administrative staff as well as senior administration to be located at each of the partner institutions, with attendant support staff. This administrative model includes central, in-country management for elements that impact the entire program and distributed leadership at each of the partner institution campuses. The design of the administrative staff focuses on Central and Campus, rather than programmatic, as Georgia 2020 students may be taking courses at any one of the partner institutions where the appropriate facilities are.

The overall design of the program is based on the concept that students from all three partner institutions will be able to matriculate into their accredited degree of interest and access appropriate facilities among the partner institutions as relevant to their education. For example, students from Georgian Technological University enrolled in the B.S. degree in Chemistry with Biochemistry Emphasis degree program may take certain advanced laboratory courses at Tbilisi State University. Electrical Engineering students at Tbilisi State University interested in a concentration in Power Engineering will similarly take upper-division Power Systems and Power Electronics at the upgraded facilities at Georgian Technological University. At the core of the concept is that Georgia 2020 students, while retaining their

affiliation with their host institution, will be Georgia 2020 students with rights and access to all program facilities in pursuit of their degree.

The details of the staffing structure can be seen in the Finalist Program Operations budget. The structure and duties of the senior staff are outlined below.



Georgia 2020 Central Administration	Number	US/International/Georgian	Fully-loaded Salary (USD)
Dean	1	US	204,480
Associate Dean – Business and Finance	1	US	170,400
Director – External Relations	1	Georgian	34,080
Director – Admissions	1	US	119,208
Director – Facilities	1	US	119,208
Director – Information Technology Systems	1	Georgian	28,400
Admissions Assistant	2	Georgian	17,040
Finance Assistant	2	Georgian	17,040

Georgia 2020 Campus Administration	Number	US/International/Georgian	Fully-loaded Salary (USD)
Director Student/Faculty Affairs	3	Georgian	28,400
Assistant Student Affairs/Admissions	3	Georgian	17,040
Support Staff	9	Georgian	11,928

17.7 Names and CVs of proposed members of the Georgia-based leadership team

17.7.1 SDSU Leadership Team

Nancy Marlin, Ph.D.
Provost of San Diego State University

Nancy Marlin previously held administrative and faculty positions at the University of Missouri and the University of Northern Iowa. She is a Professor of Psychology and holds a B.A. from SUNY Binghamton, a M.S. from Oklahoma State University, and a Ph.D. in experimental psychology from The City University of New York. She has been awarded an Honorary Master's of Business Administration Degree from the Universidad de Valparaíso (Chile), and an Honorary Doctor of Laws Degree from California Western School of Law.

Nancy Marlin is a member of the Board of Directors of the Association of Public and Land-Grant Universities (APLU) and has served as a member of the Board of Directors of the Council for Higher Education Accreditation (CHEA). She also serves on the Board of Directors of the National Conflict Resolution Center, the Board of Trustees of the California Western School of Law, and is a member of the ETS Higher Education Advisory Council. She has served on the Board of Governors for San Diego's International Community Foundation, the Honorary Board of Advisors for Phi Beta Delta and was a member of the Board of Directors of Planned Parenthood for San Diego and Riverside Counties. Dr. Marlin has been Chair of the Association of Public and Land-Grant Universities (then NASULGC) Council on Academic Affairs, she was the 2003 recipient of NASULGC's Michael P. Malone International Leadership Award for outstanding contribution to the promotion of international education, and in 2010 was one of ten U.S. higher education administrators selected to participate in the India International Education Administrators Seminar sponsored by the United States-India Educational Foundation.

Paul Wong, Ph.D.
Dean of the College of Arts and Letters

Paul Wong is the dean of the College of Arts and Letters and Director of International Partnerships at San Diego State University, where he is also a professor of sociology. His appointment at San Diego State University began on June 30, 2003. Concurrently, he is the director of the Social Science Research Laboratory, the Charles Hostler Institute for World Affairs, and the Confucius Institute.

In his current position at San Diego State University, he provides academic and administrative leadership for the College that includes eighteen academic departments, fifteen centers/institutes, a number of research journals, and the SDSU Press. The College has active international programs in more than twenty countries through exchanges, research, and degree offerings.

Paul Wong received the B.A (1964), M.A. (1966) and Ph.D. (1970) degrees from the University of California, Berkeley. He was a visiting post-doctoral fellow in economics at Berkeley in 1979. He has held academic appointments at a number of universities, including the University of California at Berkeley (1966-1969) and U.C. San Diego (1972-1976), University of Illinois (1969-1972), Arizona State University (1979-1993), and Washington State University (1993-1997). He was a fellow at the Center for Advanced Studies in the Behavioral Sciences at Stanford in 1982. He has held administrative appointments as an associate dean at Washington State University, associate provost at Colorado State University, and Dean of Social Sciences at Hong Kong Baptist University. From 1999 to 2003, he served as the dean of the

College of Arts, Sciences, and Letters at the University of Michigan, Dearborn, where he also established and directed the Center for Arab American Studies. Concurrently, he served on the core faculty of Asian Pacific Studies in the Program in American Culture at the University of Michigan, Ann Arbor where he taught both undergraduate and graduate courses. He was a faculty associate of the Center for Chinese Studies at Ann Arbor.

He has served as a consultant for various organizations such as American College Testing, the United States Equal Employment Opportunity Commission, Mexican American Legal Defense and Educational Fund, Department of Health and Human Services, Department of Defense, Centers for Disease Control, United States Public Health Service, and the Office of the Arizona State Attorney General. He served on the Arizona Governor's Task Force on Educational Reform in 1991-1992. He was appointed by the Chief Executive of Hong Kong to serve as a member of the University Grants Committee (UGC) of Hong Kong, 2000-2002. The UGC oversees the development and funding for the eight public universities in Hong Kong. He has served on the National Advisory Council of the Center for Substance Abuse Prevention of the Substance Abuse and Mental Health Services Administration. He serves on the Board of Trustees of People-to-People-International, a global educational and philanthropic organization founded by President Dwight Eisenhower.

His research has been supported by various funding sources such as the National Science Foundation, National Institute of Mental Health, Rockefeller Foundation, U.S. Sentencing Commission, Spencer Foundation, Ford Foundation, Department of Defense, Department of Education, Department of Housing and Urban Development, Rosenberg Foundation, Department of Health Resources and Services Administration, and Administration on Aging, He has reviewed proposals extensively for federal and state agencies as well as foundations.

Stanley Maloy, Ph.D.
Dean of the College of Sciences, Professor of Biology

Stanley Maloy obtained a PhD in Molecular Biology and Biochemistry from the University of California at Irvine, did a postdoctoral fellowship at the University of Utah, then moved to a faculty position at the University of Illinois in Urbana-Champaign where he served as a professor for 18 years. While at the University of Illinois, he served as Director of the Illinois Biotechnology Center, a scientific center for genomics, proteomics, fluorescence activated cell sorting, bioinformatics, and other resources.

In 2002 he moved to San Diego State University as founding Director of the Center for Microbial Sciences and Professor of Biology. In 2006 he became Dean of the College of Sciences. The College of Sciences includes eight Departments, several cross-cutting interdisciplinary programs, the Mt. Laguna Observatory, several ecological research stations, and the Coastal & Marine Institute Laboratory.

He is the author of over 100 journal articles and 10 books, including a widely used textbook. He has won multiple awards for teaching. He has organized numerous international courses and conferences in the US, Europe, Asia, and Latin America. He is a Fellow of the American Academy of Microbiology, a highly selective scientific honor society.

From 2004-2007 he served first as President-Elect, President, then Past-President of the American Society for Microbiology (ASM), a scientific society with over 43,000 members, and financial resources over $100M. He subsequently served for 5 years as chair of the ASM committee on communicating science to the public.

He has consulted with large agricultural and pharmaceutical companies and small biotech companies, including serving on several Scientific Advisory Boards and as Chief Scientific Officer of Vaxiion Therapeutics Inc. He has served as chair of National Institutes of Health Study Sections and as a grant reviewer for numerous national and international funding agencies. He has served on numerous federal advisory groups on biosafety and biodefense, and research and health policy. He has testified before the United States House Appropriations Committee about federal funding for scientific research. He serves on several boards focused on improving math and science education. He reviews manuscripts for numerous scientific journals and is a member of several journal editorial boards.

His research focuses on bacterial and phage genetics and physiology, the evolution of microbial diseases, and the development of new vaccines and antibiotics. He is currently funded by the National Cancer Institutes, the National Institute of General Medical Science, and the W. M. Keck Foundation.

Alan Sweedler, Ph.D.
Assistant Vice President, International Programs, Professor of Physics
Director, Center for Energy Studies and Environmental Sciences

Alan Sweedler is the Assistant Vice President for International Programs at San Diego State University, where he also is Professor of Physics, Director of the Environmental Sciences Program and the Center for Energy Studies. Professor Sweedler is responsible for the international activities of SDSU and oversees the Office of International Programs.

Professor Sweedler's academic expertise is in the area of energy policy and technology and has been a leader in developing energy policy and researching energy issues for over 30 years, especially in the greater San Diego Region, including Mexico. He was a founding Board member and Chair of the San Diego Regional Energy Office, now the California Center for Sustainable Energy, the largest non-profit energy center of its kind in the United States. He is currently on the Board of Directors of Clean Tech San Diego, an industry trade group that promotes clean technology and is also the Director of the California Energy Commission's Energy Innovation Small Grants Program, a $5 million annual grant program that awards grants for new, innovative research in the area of energy technologies. In addition, Professor Sweedler is active in the innovation economy of San Diego through angel venture investment and encouraging young entrepreneurs.

Before joining SDSU in 1980, Professor Sweedler was a research physicist at Brookhaven National Laboratory working in the area of radiation effects on superconductors. In 1985 he was selected as one of two nationally chosen Congressional Science Fellows by the American Physical Society and he worked in the US Senate on issues of energy, water and national security. In 1987 he was awarded a Carnegie Foundation Science Fellowship at Stanford's Center for International Security and Arms Control and was a visiting scholar at the University of California's Institute on Global Conflict and Cooperation in the early 1990s. In recent years he has focused on the environmental impacts of energy use, the energy-water nexus, climate change and international security, as well as the development of renewable energy technologies in the greater San Diego region. He holds a Bachelor of Science degree from the City University of New York and a PhD in physics from the University of California, San Diego.

Kenneth D. Walsh, Ph.D. P.E.
Chair, Department of Civil, Construction, and Environmental Engineering
Director, J.R. Filanc Construction Engineering and Management Program
AGC-Paul S. Roel Chair in Construction Engineering and Management
Professor, Department of Civil, Construction, and Environmental Engineering

Ken Walsh has a Ph.D. in Civil Engineering from Arizona State University (1993) , M.S. in Civil Engineering from Arizona State University (1988), and a B.S.E. in Civil Engineering from Arizona State University (1986). From 2011-present he has been Chair of the Department of Civil, Construction, and Environmental Engineering at San Diego State University. From 2007-present he has been a Professor in the Department of Department of Civil, Construction, and Environmental Engineering
San Diego State University, and from 2002-2007 he was Associate Professor in the Department of Civil and Environmental Engineering at San Diego State University, and from 2000-2002 he was Associate Professor at the Del E. Webb School of Construction at Arizona State University, and from 1994-2000 he was Assistant Professor, at the Del E. Webb School of Construction at Arizona State University.

In addition to his academic experience, Ken has extensive industry experience. From 1990-1994 he worked at Huntingdon Engineering and Environmental in Chandler, Arizona as a Staff Geotechnical Engineer, and he worked as Senior Program Manager for Environmental Services. From 1986-1989 he was Staff Engineer at SEA Incorporated in Phoenix, Arizona. In addition, he has extensive international consulting and speaking experience.

R. Lal Tummala, Ph.D.
Professor and Chair, Department of Electrical and Computer Engineering

Lal Tummala received a Ph.D. in Electrical Engineering from Michigan State University, then joined the faculty of the Department of Electrical and Computer Engineering, where he became a full Professor. During his tenure at Michigan State University, he also held joint appointments with the Department of Mechanical Engineering, Material Science and Mechanics. In 1994, he was appointed as the Director of Interdisciplinary Manufacturing Engineering Program administered jointly between the Colleges of Business and Engineering.

Lal Tummala was appointed as Professor and Chair of the Department of Electrical and Computer Engineering at San Diego State University in August 2002.

He has developed undergraduate courses, graduate courses and laboratories with funds received from Westinghouse Corporation, Society of Manufacturing Engineers Education Foundation, Motorola Corporation and National Science Foundation. At San Diego State University he was instrumental in receiving continuation of ABET accreditation for the Electrical Engineering Program and in receiving ABET accreditation for the first time for the Computer Engineering Program. He has built partnerships with the companies such as freescale (formerly Motorola) and others to support some of the curricular activities. He talks to leaders of the corporations in San Diego to assess their needs whenever possible. He formed an Industrial Advisory Board to assist him in curriculum and programmatic changes.

Lal Tummala developed interdisciplinary Masters Degree programs both at San Diego State University and Michigan State University. He developed a 5-year dual degree during his tenure at Michigan State University. This is a joint program between the College of Engineering and Eli Broad College of Business. As the Director of the program, he was instrumental in the development of interdisciplinary curriculum for this program by working with the faculty from various departments in both colleges, hired new faculty, formed an industrial advisory board and developed many required courses. At San Diego State University, he developed an interdisciplinary Masters Degree Program between the College of Business and College of Engineering to meet the needs of the San Diego Industrial community partially funded by Northrop Grumman. The program is available for all the disciplines in the College of Engineering and

growing rapidly with the support of local industry. In spring 2009, he took the initiative and successfully negotiated an agreement to offer this program to Qualcomm employees at their premises.

Lal Tummala is a member of the advisory board for the Electrical Engineering Handbook published by IEEE (Institute of Electrical and Electronics Engineers), author of review book chapters for Professional License examination and consultant for several engineering textbook publishers. His research deals with Robotics, Intelligent Control and Design of Environmentally Conscious Manufacturing Systems. He has received funding for his research from National Science Foundation, DARPA, Environmental Protection Agency, Westinghouse Corporation, Consumer Power Company, US Tank command, and Dow Chemical Company. He has made fundamental contributions to sensor based robotics, flexible robot control, environmentally conscious manufacturing, life cycle studies and product design. His research transcends interdisciplinary boundaries, resulting in significant engineering contributions to areas other than engineering. He has edited the first ever book on the novel subject of System Modeling for Pest Management. The system models and on line management systems developed by him are used world-wide. He has over 75 technical publications including books and journal articles.

He served as a Program Committee member, Session Organizer and Session Chair for various national and international engineering and business conferences. He is also a reviewer for IEEE journals. He was invited to serve as Guest Editor for special issue of IEEE Robotics and Automation Magazine dealing with Distributed Robotics in 2002. He was a Keynote Speaker at the 27th International Conference on Computer Applications held in Las Vegas in 2012.

During the last 40 year of his career, Lal Tummala received many Awards and Honors. His recent awards include: Outstanding Engineering Educator Award in 2007 from San Diego Engineering Council and Award for Outstanding Research Contribution to Manufacturing Engineering Education, presented at the Global Congress on Manufacturing and Management in 2008. Lal Tummala is a senior member of the Institute of Electrical and Electronics Engineers (IEEE), was a Senior Member of Robotics International of Society of Manufacturing Engineers (SME), and served these societies in many capacities.

William Tong
Distinguished Professor and Chair, Department of Chemistry and Biochemistry

Bill Tong received his Ph.D. in 1984 from Iowa State University and Ames Laboratory, U. S. Department of Energy, and he was a postdoctoral fellow for one year at the Oak Ridge National Laboratory, U.S. Department of Energy. In 1985, he joined San Diego State University as an Associate Professor. In 1989, five years after receiving his Ph.D., he was promoted to Professor. He has supervised 20 Ph.D. (University of California San Diego and San Diego State University JDP) and many more Masters and postdoctoral students and visiting scientists/professors. His former Ph.D. students have become leaders in biotech companies and taught at major universities (Arizona State University, University of San Diego, University of California San Diego, etc.). He has been awarded major grants by the National Science Foundation, National Institutes of Health (R01), National Institute of General Medical Sciences, U.S. Department of Defense, U.S. Department of Homeland Security, U.S. Army Research Office, Lockheed Martin, Beckman, Varian, Johnson and Johnson and other funding agencies. He holds patents on ultrasensitive nonlinear laser methods and major companies have licensed his technology. He has presented more than 370 papers including 2012 invited seminars at Oxford University, UK, and the Max-Planck-Institut fur Quanten Optik in Munich hosted by Physics Nobel Laureate Ted Hansch. Bill regularly serves on NIH and NSF review panels and study sections and he also reviews for top research journals. He served on the SDSU Campanile Foundation Board for six years (2006-2012). Bill has also founded and

incorporated a technology company in La Jolla, California, and his company has obtained U.S. Department of Defense contracts.

Bill was named the 2003 Distinguished Scientist (San Diego Region) by the American Chemical Society (2 of the 20 winners of this award won the Nobel Prize in Chemistry later). In 2005, he received the SDSU Albert Johnson University Research Award and the Distinguished Achievement Award from the Sigma Xi Research Society. He also received the 2007 SDSU Alumni Award (Monty) and the 2008 SDSU President Leadership Award. He was awarded the 2002 SDSU Technology Innovation Award and the Outstanding SDSU Faculty Award in 1990, 1991 and 2000. His research projects on ultrasensitive detection of biomarkers for biomedical applications (Alzheimer's, Parkinson's, cancer, HPV, HIV, etc.) and chem/bio agents for environmental and security applications have been reported and highlighted by Analytical Chemistry, Applied Spectroscopy (cover story), San Diego Union-Tribune (front page) and San Diego TV stations (ABC, CBS, NBC, Fox, KUSI, KPBS, UCSD-TV and University of California-TV). He is the PI and Program Director of the SDSU NIH IMSD Program ($2.8M current) that provides year-round mentorship to underrepresented students in order to help them enter Ph.D. degrees in STEM areas (e.g., Caltech, Stanford, Harvard, Yale, etc.), and in 2013, 10 of 11 graduating IMSD scholars received multiple offers to attend Ph.D. programs (e.g., 2 from Harvard). He is also the chair of the Department of Chemistry and Biochemistry that created the first Joint Doctoral Program in the California State University System.

17.7.2 Partner Institution Leadership Team

17.7.2.1 Georgian Technological University

Prof. Dr. Alexander Milnikov

Position: Lecturer

Education

Doctor of Sciences, TECHNICAL UNIVERSITY, Applied Mathematics, 2002, Tbilisi/GeorgiaPh.D, GEORGIAN AGRICULTURAL UNIVERSITY, Mechanical Engineering, 1976, Tbilisi/GeorgiaM.S. , GEORGIAN TECHNICAL UNIVERSITY, Engineer of Electronics, 1970, Tbilisi/Georgia

Academic and Administrative Experiences

Full Professor (part-time) , GEORGIAN TECHNICAL UNIVERSITY, DEPARTMENT OF INFORMATION TECHNOLOGIES, 1999-present

Full Professor , INTERNATIONAL BLACK SEA UNIVERSITY, Computer Technologies and Engineering/Informatics, 1997-present

Dean of the Engineering Faculty , INTERNATIONAL BLACK SEA UNIVERSITY, Computer Technologies and Engineering/Industrian Engineering and technology, 1994-2008

Academician (1980-1988), Leading Academician (1989-2005), Principal Academician (2005-present), GEORGIAN ACDEMY OF SCIENCES, Institute of Applied Mechanics , 1980-present

Courses taught in undergraduate level, graduate level

2012 "Advanced Methods of Scientific Data Analysis "

2011 "Information Theory "

2009-2010 "Decision Theory"

2008-present "Decision modeling with Spreadsheets"

2008-present "Inventory Control and Operations Scheduling "

2008 "Signals and Circuits' Theory "

2005-2007 "Quantitative Methods for Business "

2004 "Statsitics "

2003 "Electrical Engineering "

1998-present "Engineering Economy "

1997-present "Statistical Quality Control "

1996-present "Operations Research "

17.7.2.2 Ilia State University

Gigi Tevzadze

Has been the Rector of Ilia State University since 2006. Before that, Mr. Tevzadze was the Director of the Education Project, an initiative of the Ministry of Education and Science of Georgia. He also has been the Chair of the Department of Philosophy and Social Sciences at Tbilisi Chavchavadze State University for Language and Culture, Director of the NSIC- and OSGF-funded Culture of Legality Program, and a member of the State Council for the Coordination of Anticorruption Politics. From 2001 to 2003, Mr. Tevzadze led the National Curriculum reparation and Implementation Group for the World Bank's Georgian Educational System Realignment Program, and was also employed as a local consultant for the project. From 1997 to 1999, he was the Head of the Research Department at the Parliament of Georgia, and a reporter for the European Center for Parliamentary Research and Documentation (ECPRD). At the same time, Mr. Tevzadze was a Professor in the Department of Philosophy and Sociology at Tbilisi State University, and a regional consultant for the UNDP. He has published extensively and is the author of ten books.

17.7.2.3 Tbilisi State University

Dr. Ramaz Botchorisvili
Dean, Exact and Natural Sciences

Dr.Hab. in Theoretical Basis of Mathematical Modelling, Numerical Methods, Program Complexes, Tbilisi State University. Thesis: "Numerical Methods that Converge in Minimal Apriori Estimates for Nonlinear Scalar Conservation Laws", Certified Tbilisi, 1995.
Ph.D. in Computational Mathematics, Muschelishvili Institute of Computational Mathematics Academy of Sciences of Georgia. Thesis: Application of Flux Vector Splitting to 2-Dimensional Gas Dynamic Equations. Certified, Moscow 1989.

MS, Faculty of Cybernetics and Applied Mathematics, Tbilisi State University, Diploma in Mathematics, 1983.

Work Experience
1983 Tbilisi State University, Vekua Institute of Applied Mathematics, Department of Numerical Analysis. Career details: programmer, junior researcher, researcher, senior researcher, head of the department - current position, part time.
1989 Tbilisi State University, Faculty for Mechanics and Mathematics, Department of Informatics and Computational Mathematics. Career details: programmer, associate professor, full professor - current position, part time.
1997/12-1999/04 Branch Center of Training Center of The Ministry of Social Welfare. Position: head of the Branch Center.
1999/04-2000/03 INRIA-Roquencourt, visiting researcher.
2001/02/-2001/08 Universite Pierre et Marie Curie (Paris 6), Laboratoire Jaques-Louis Lions, visiting professor.
2002/01 Fraunhofer Institute for Algorithms and Scientific Computing, researcher.

Awards
First Prize of Georgian Mathematical Union, 1994.
Fellowship of President of Georgia, 1998.
NATO Fellowship, 1999.

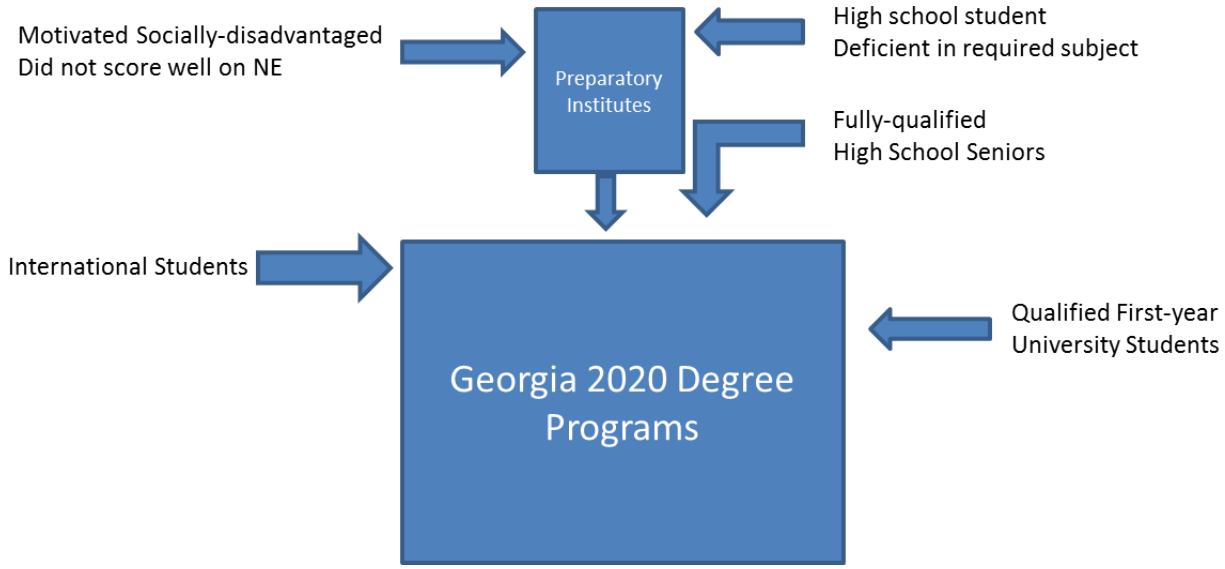
Marine Chitashvili
Vice-Rector in Strategic Development of Ivane Javakhishvili Tbilisi State University

Professor Chitashvili is a one of the founders of CSS. She oversees overall the development and administration of CSS. She was the project director for OSF HESP grant - "Social Sciences Support Program at Tbilisi State University" 2003-2009. From 2009 till December 2011 she was the project director for OSF HESP grant - "Graduate programs at the Faculty of Social and Political Studies at TSU". Currently she is involved in applied social research development at CSS in Education and Gender Equality.

After graduation of TSU in 1980 she first worked as a researcher at different positions at Institute of Psychology Georgian Academy of Science and since 1990 till present she works at TSU. 1990-95 Head of Psychology of Religion Research Group at TSU Center for Religious Studies, 1995-till present academic staff and since 1999 September Full Professor of TSU. 2003-05 Head of General Psychology Department; in 2005 March-July Head of Academic Department of TSU. She has published 2 books and over 80 papers. She was Fulbright scholar at Stanford University [2007]; DAAD research fellow at Ludwig Maximilian University Munich [2006]; Visiting exchange scholar at Saarland University [2003, 2001]; The Swedish Institute fellow Guest Researcher at Lund University [1995]. Since 2011 Prof. Chitashvili is Life Visiting Fellow at Wolfson College, University of Cambridge. Professor Chitashvili directed CSS in 2003-2013. In September 2013 she resigned due to her appointment as a Vice-Rector in Strategic Development of Ivane Javakhishvili Tbilisi State University.

18 Task 12 – Recruitment, Admission, Preparation Plan

18.1 Assess the current student recruitment process – develop a plan for improvements



Responsive to the Technical Evaluation Panel comments relevant to criterion 3, Georgia 2020 now proposes a modified portfolio approach to ensuring sufficient enrollment to make the program sustainable.

Of critical importance is to establish the programs as a valid selection under the national university system. This will be done immediately upon award, leveraging existing academic collaborators at the partner institutions, as well as the program design and accreditation as articulated in this proposal. Clearly, listing of the programs will not be sufficient to stimulate enrollment, and in parallel (anticipating few obstacles to being acknowledged as an authorized degree program), intensive outreach will begin supported by the investment budgets designated for those purposes.

18.2 High School Recruitment – Recruitment Strategy Overview

The primary enrollment strategy will be to leverage the existing national enrollment system of the Government of Georgia. A critical component of the start-up process will be to accredit and certify the Georgia 2020 programs at each partner institution for listing along with the other national university selections available to students as choices pending their national examination results.

Listing the programs will not be sufficient to stimulate selection of these programs, and it is expected, even if initially selected, many high school students will not have sufficient English language or STEM skills to be successful. To mitigate this risk, and to extend the reach of the program to potentially students from socially-disadvantaged groups, a parallel immediate action will be to include outreach directly to high school students starting their senior year with a multi-faceted message concerning the Georgia 2020 program. Among the key messages will be:

- Description of the program
- Relationship between SDSU and the national universities they may be more familiar with

- Value of an internationally-recognized degree
- Cost of the program
- Availability of scholarships and living expenses aid

Students expressing provisional interest will be invited to take, at the program's cost, an English language evaluation to be administered by SDSU's American Language Institute or Language Acquisition Resource Center. This low-cost evaluation has been shown to be as predictive of language success in the academic environment as either the TOEFL or the IELTS, and can be administered at a much lower cost. The ALI is a division of the College of Extended Studies, one of the eight colleges of SDSU. The ALI is a renowned teacher training center, educating teachers from around the world in the latest English as a Second Language (ESL)/English as a Foreign Language (EFL) teaching techniques and methodologies, in addition to being the only San Diego region member of the University and College Intensive English Programs organization (UCIEP) and the American Associated of Intensive English Programs (AAIEP) and NAFSA – the Association of International Educators.

Enrollment in the voluntary evaluation will give Georgia 2020 an early indicator of demand and qualifications for the program. In addition, students that express interest in the program and agree to be evaluated will be invited to take both the SDSU Chemistry Placement Examination, and the Mathematics Placement Examination.

The Chemistry Examination covers the following topics in chemistry and mathematics at the high school level.

- Elements and Atoms: basic properties, atomic number, atomic mass, isotopes, Lewis symbols, valence electrons, electronic configurations, use of the periodic table
- Compounds and Molecules: physical properties, molecular mass, naming inorganic compounds, formula calculations, simple Lewis dot structures
- Reactions: Balancing equations, simple stoichiometry, equilibria, enthalpy, entropy, simple kinetics
- Bonding: Ionic, covalent, metallic
- Gases: Use of the ideal gas law
- Solutions: Molarity, dilution, basic ideas of acids and bases, properties of electrolytes
- Mathematics: significant figures, simple algebra

The Mathematics Examination covers the following Precalculus topics at the high school level:

- Rational Expressions
- Exponents and Radicals
- Linear Equations, Inequalities, and Absolute Value
- Polynomials and Polynomial Equations
- Functions
- Trigonometry
- Logarithmic and Exponential Functions

Students that do not demonstrate sufficient fluency via the ALI evaluation will be invited and encouraged to enroll the Georgia 2020 English Language Institute in parallel with their final year of high school education. Through this early intervention, Georgia 2020 will begin to address the requirements for English language competency for admission.

Similarly, deficiency in the Chemistry or Mathematics Examination will allow students to participate in a STEM Preparatory Institute that may include a modified Chemistry 100 curriculum. Chemistry 100 is an introduction to general chemistry. By the end of this course a successful student would be able to:

1. Execute basic chemistry calculations such as unit conversions and stoichiometry;
2. Explain the basic principles of atomic theory and chemical bonding;
3. Quantitatively and qualitatively describe physical and chemical properties of matter;
4. Illustrate the concept of dynamic equilibrium with acid-base chemistry;
5. Analyze a problem and decide the best method to solve;
6. Understand how the material relates to examples drawn from news and life;
7. Combine material learned in individual chapters to form an overall "big picture";
8. Safely and confidently conduct protocols in a laboratory environment.

These activities are directly supported through a budgeted line-item of $400/student, *in addition* to budgeted instructor salaries for instruction during CY1, when no other Georgia 2020 academic courses are scheduled. These efforts and expenditures are *exclusively* dedicated to identifying and preparing an appropriate student body for matriculation into the program in CY2.

Finally, students from socially-disadvantaged groups that show either aptitude or willingness to participate, but may have difficulty with the Georgian National Examination may be offered targeted National Examination preparatory courses in addition to the English Preparatory or STEM Preparatory courses.

Through this portfolio of recruitment and preparation activities, Georgia 2020 will mitigate risks associated with the aggressive enrollment strategy proposed.

18.3 First-Year Admits

Georgian partner institutions will matriculate a group of first-year students in parallel with the launch of the Georgia 2020 program. Although these students will have provisionally selected their course of study, our partner institutions allow for intra-institutional transfer between disciplines during the first year of study.

The Georgia 2020 opportunity will be introduced to the incoming class similarly to how it will be introduced to the Fall 2014 high school senior class. The opportunity and value proposition will be presented, along with an opportunity to take the English language evaluation and potentially join the English Language Preparatory Institute in anticipation of transferring to the Georgia 2020 degree program. Anecdotal evidence from the Georgian partner institutions suggests that some students already enrolled would prefer to begin the four-year degree under the Georgia 2020 program. This preliminary interest further emphasizes the value of an internationally-recognized accredited degree to the Georgian student body.

18.4 Task 12a – Assess the current recruitment process

Given the current nationalized system of entrance for Georgian state institutions, existing recruitment programs for public universities are very limited. Although institutions do compete informally based on their reputations, cultures, and success of their graduates, formal outreach and recruitment not required. Georgia 2020 will implement a formalized outreach and recruitment program to meet two principal goals. First, because the program will be new to the Republic of Georgia, and have out-of-pocket tuition costs associated with it, a clear articulation of the value proposition is required. Second,

the extensive admission requirements require substantial advanced notice and resources to allow interested students to prepare to meet the admission requirements.

18.5 Task 12b – Conduct of recruitment and admissions

Georgian students applying for entry to the Georgia 2020 collaborative are expected to be high performing and highly motivated to acquire an internationally-recognized degree. To be considered for admission, students will have to submit an Application Fee, an Enrollment Application Form, evidence of benchmark or higher achievement on Georgian entrance exams in General Aptitude, English Language, and Mathematics, and an approved English language test score that meets SDSU entrance requirements for international students. For example, this requirement could be met by earning a score of 6.5 on the International English Language Testing System (IELTS) administered in Georgia at the British Council in Tbilisi, a score above 80 on the Test of English as a Foreign Language (TOEFL), or a passing score on an exam administered by SDSU.

Upon acceptance to the Georgia 2020 program, the incoming students will be required to take the appropriate SDSU placement examinations, including the Precalculus Proficiency Assessment and the Chemistry Placement Examination to facilitate appropriate placement within the curricular path.

Recruitment and admissions will be managed centrally, by the Georgia 2020 Director of Admissions, supported by both the centralized Admissions Assistant and Student Affairs Assistant, and facilitated at each campus by the resident Director of Student/Faculty Affairs. Although recruitment and admissions will be managed locally, records and transcripts will continue to be held by SDSU's Office of Admissions and Records as overseen by Vice President for Enrollment Services, Sandra Cook.

18.6 Task 12c – Recruitment and Retention of Socially Disadvantaged Students

SDSU enjoys a national reputation for the successful recruitment and retention of woman and minorities. The fact that SDSU is a university with no majority student ethnic group is evidence of success in recruitment and admissions. But far more importantly is the success of all students, and SDSU is one of the very few research universities in the United States that has essentially eliminated the so-called achievement gap among ethnic groups. All students, including those from minority groups, graduate at approximately the same rate. SDSU is rated 13 in the nation for the number of bachelor's degrees awarded to Hispanics.

Part of our institutional success in this area is the effort to address academic needs of students prior to their matriculation at the university. Specifically, all incoming students are required to take placement exams in English and mathematics. If students do not achieve the required scores to demonstrate, through these exams, their academic preparation to undertake university-level coursework in these areas, they are required to enroll in remedial courses during the summer preceding their fall matriculation at the university. This approach has greatly increased the number of minority students who enter academically prepared. This approach also allows for acculturation to the campus environment and resources prior to actual enrollment.

Once enrolled, SDSU offers several programs targeted to supporting women and minority students. Within the College of Engineering there is the MESA Engineering Program, which provides advising, internships and tutoring. The College of Sciences houses the Center for Advancement of Students, which includes opportunities for participation in undergraduate research, faculty and peer advising and mentoring. Both of these programs are described in more detail in section X.

Based on our discussions with many government and university officials, we plan to implement a pilot program during the first year of the program. This pilot program will involve targeted recruitment from Batumi State University and Kutaisi State University, placement tests for English and mathematics and special support program through faculty and peer advising. This pilot program will emphasize culturally appropriate services with advice from partner universities.

One component of the pilot program will be the review of national examination scores that do not meet the minimum criteria for admission to the national university system. Although in some cases, these scores may simply be due to under-performing students, it is possible that the group of students not scoring well enough for automatic admission may be over-represented by socially disadvantaged students. By querying these students in particular, Georgia 2020 will identify highly motivated students that may benefit from a bridging package including English language preparation, STEM preparation, national examination preparation, along with a minimal living stipend to allow them to have access to these services in Tbilisi.

18.7 Task 12d – Academic Preparation Assessment

Georgia 2020 will provide a number of entry points to the program. The most straightforward will be admissions based on performance on the Georgian National Examination. Entrance requirements will be set for each program in collaboration with existing partner institutions that currently set their admissions scores based on program capacity and the relative complexity of the discipline. Those entrance scores are yet-to-be-defined, but will likely be substantially higher than the minimum required score for national university acceptance. Georgia 2020 will preserve the additional English language requirement which can be met by a score of 6.5 on the International English Language Testing System (IELTS) administered in Georgia at the British Council in Tbilisi, a score above 80 on the Test of English as a Foreign Language (TOEFL), or a passing score on an exam administered by SDSU. These entrance requirements are consistent with the existing admission requirements for all foreign students at SDSU.

As noted above, where feasible, socially disadvantaged students may be identified through the high school outreach program and offered opportunities to improve their English language proficiency, STEM preparedness, and performance on the Georgian national examination to assist them in meeting the stringent admissions requirements for the Georgia 2020 program.

18.8 Task 12e – Plans for Student Scholarships and Financial Aid

Sufficient scholarship aid is budgeted to support up to 25% of the student body in any given enrollment year with up to $4,000 in merit or needs-based scholarship, with an additional $1,000 student aid grant to be used for living expenses. In particular, the living expenses grant is viewed as an innovative and culturally appropriate approach to facilitating the participation of rural and socially-disadvantaged students that may encounter greater logistical obstacles with attending the university in Tbilisi. Scholarship aid tracks with projected enrollment to preserve the 25%/$4,000 + $1,000 capacity.

Although scholarship aid is budgeted according to the bulk estimates described above, based on student merit and the participation and demonstration of financial need, individual students may be designated as eligible for more or less than the $4,000 average award. Similarly, national examination and other merit criteria combined with the demonstrated need of students may allow for greater than 25% of the enrolling student body to receive some level of aid (although at a total average level that would be, by necessity, lower than the projected $4,000/student).

The current scholarship budget allows for maximum flexibility, and determinations to be made during the enrollment period based on the performance and composition of the incoming class.

Criteria for merit will be established in collaboration with the partner institutions, and may match or exceed the performance metrics set by the Government of Georgia for full support under the national university system. Similarly, needs-based criteria will be developed in collaboration with partner institutions, but may include criteria similar to the United States Federal Application for Student Aid (FAFSA). Criteria typically used are, at a minimum: an identifying number or verification of national status, forms related to recent income tax payments. As in the U.S., these documents are not required, but are provided voluntarily in exchange for consideration of needs-based scholarships.

18.9 Regional Recruitment

Georgia 2020 undertook a preliminary and informal investigation of the regional educational market to place potential regional recruitment in context. For comparison, Turkey was investigated. Regarding the private institution market – students most likely to pay out-of-pocket, there are 70+ private universities now. The oldest started in 1986. The most expensive Turkish university is approximately $18,000 per year (Sabanci University) with the second most expensive $16,500 (Koc University). Bahcesehir and Istanbul Bilgi average $14,500/year with different tuitions based on the discipline. Bilkent University, the oldest and most established private university located in Ankara is $11,000/year.

Given this rough context for international students, the Georgia 2020 program could represent a good option for international students in the region. It is common practice to apply differential tuition rates to resident or non-resident students – for example, at SDSU the total non-resident tuition fee of $17,926. If regional recruitment became a programmatic priority for strategic, revenue generation, and sustainability, it is expected that non-Georgia students would also be charged a non-resident fee greater than the costs for Georgian students. Although it is too early to specify a non-resident tuition, it appears that a tuition of $10,000/year could be easily borne by a substantial number of students in Turkey, and additional revenue from even a small percentage of foreign students would contribute to the long-term sustainability of the program.

If the underlying program appears to be meeting the objectives of educating Georgian students and building the capacity at the partner institutions to achieve ABET accreditation, then program development funds could be directed at a foreign recruitment program with a closely monitored tuition ensuring that the program would be self-sustaining without diminishing access for Georgians.

19 Task 13 – Student Learning and Support

a. Describe existing Georgian Partner Institution academic advising and other academic support systems.

Partner institutions presently support informal and self-assembled student-help groups. For example, at Tbilisi State University, upper-division students proactively hold review and practice sessions to help freshmen and sophomore students in difficult courses. Their assistance is often very effective. Student helps sessions cover a variety of subjects from programming languages to fundamental math and physics courses. Participation from freshmen and sophomores varies, but those that participate tend to pass with high marks. Student attendance increases immediately before the midterm exams when the voluntary reviews become more intense – daily rather than once a week. Topics covered include theoretical and practical applications, and students use the internet extensively for communication. The program has continued to be successful with student leadership, but also recognition from the faculty. Student George Baqradze uploaded more than 100 video tutorials "Programming language: Java for starters". This project was one of the winners of the first Student Innovation Competition of the Faculty. Students Giga Chalauri and Grand Laluashvili have uploaded 10 videos that discuss algorithms both theoretically and practically and Giga Chalauri's blog is popular among students (719 likes).

b. Plan for improving advising and academic support.

We plan to develop academic support structures that mimic successful programs at SDSU, including academic advising by dedicated staff, peer-advising programs, and academic support including electronic library resources. Academic support, advising and student mentors have all been specifically planned under the project budget on a per-student basis. These programs are common and popular with students at SDSU, and will be implemented with shared governance between the university and program administration and the student bodies.

c. Special services and resources for SDSU-Georgia degree students.

Library and virtual resources have been substantially budgeted. Access to the electronic resources at the SDSU library will be limited to students enrolled in the SDSU-Georgia program because many subscription services have costs calculated on a per-student basis, so addition substantially more than the 2000 SDSU-Georgia program students will be cost prohibitive. Advanced financial (Bloomberg Terminal) computers, as well as access to SDSU's Infodome periodical subscriptions will be accessed via the SDSU-Georgia students' RED Identification Number (RED ID). The RED ID serves as the key to SDSU's complete suite of virtual student services, and will be issued as a matter of course during the admission process.

d-e. Research, internship, and service learning plans.

The undergraduate experience in science and engineering at SDSU includes many well-documented high-impact practices for student success, including:

- First-year seminars and discussion groups that bring small groups of students together with faculty or staff on a regular basis.
- Common required courses that integrate concepts across the curriculum.
- Learning communities that encourage students to think about "big questions" that matter beyond the classroom.
- Writing-intensive courses that emphasize writing at all levels of instruction and across the curriculum. Students are encouraged to produce and revise various forms of writing for different audiences in different disciplines. Similar efforts integrate concepts of oral communication, information literacy, and ethical inquiry.
- Collaborative learning assignments promote learning to work and solve problems as a team with others.
- Undergraduate research experiences providing students with real research projects that demand empirical observation, cutting-edge technologies, work with a team of undergraduate and graduate students and professors, and the sense of excitement that comes from working to solve important questions.
- Courses that help students explore cultures, life experiences, and worldviews different from their own. These experiences are augmented by experiential learning in the community or by study abroad.
- Internships that provide students with direct experience in a work setting related to their career interests, providing the opportunity to interact and learn from professionals in the field. If the internship is taken for course credit, students complete a project or paper that is approved by a faculty member. Other internships include a stipend to support the student.

These approaches are integrated into the proposed curriculum for the program in Georgia. It is clear that high impact practices like these enhance student success in STEM disciplines as measured by retention, time to graduation, and subsequent employment or entry into an advanced degree program. Although the focus of this proposal is on the undergraduate curriculum, undergraduate research experiences are particularly valuable for providing students with the STEM and team skills sought by industry. A substantial proportion of students at SDSU participate in undergraduate research with faculty scientists who are working on grant-supported projects. The focus on learning via hands-on research is a hallmark of the mission and philosophy of the College of Sciences. This hands-on training facilitates understanding of science and helps graduates gain an edge in competing for graduate school acceptance. This edge often takes the form of a strong curriculum vita with student authored publications and presentations.

In a detailed survey of support and persistence for undergraduates in engineering disciplines, internships, scholarships, and peer support have all been recognized as incredibly importance for student success[4], and SDSU takes these findings and experiences very seriously. The proposed industry advisory board will have an important role in establishing and placing student in paid internships.

For example, SDSU's successful Troops to Engineers program has focused on placing veteran students in engineering internships. The pilot program has proven to be an effective means of supplying industry with Science, Technology, Engineering and Math (STEM) majors for internships and new graduate positions. Since the program's inception in February, 2011, 144 student veterans have been placed in paid internships and full time positions when they graduate. Every student veteran seeking a paid internship has been placed and every graduate of the program is working in their field of study. The program cost has been approximately $160,000 per year and over $2 million has been garnered in internships, paid for by industry. Student veterans have been placed in sustainable jobs at the low cost of approximately $3300 per student veteran. Most transition programs for military personnel greatly exceed that cost.

Table 16. Importance ratings by ethnicity. Adapted from Haden 2007.

FACTORS	Minority		Non-Minority	
	Mean	SD	Mean	SD
Internships	4.26	1.07	4.04	1.16
Scholarships	4.51	1.04	3.81	1.39
Faculty member support	3.63	0.97	4.03	0.94
Family emotional support	3.89	1.32	3.87	1.10
Peer social interactions	3.34	1.33	3.73	1.02
Family financial support	3.49	1.44	3.58	1.40
Peer study groups	3.43	1.22	3.44	1.19
Career Counseling	3.65	1.25	3.13	1.29
Tutoring	3.54	1.31	3.01	1.44

[4] Haden, C. (2007) AC 2007-2282: Evaluating Support for Underrepresented Students in Engineering Degree Programs. American Council for Engineering Education, Proceedings, Annual Conference and Exposition. Download from:http://soa.asee.org/paper/conference/paper-view.cfm?id=5544.

Student Loans	3.26	1.56	3.02	1.62
Clubs/Organizations	3.20	1.08	2.96	1.22
Engineering Staff	3.00	1.08	1.91	1.01
Engineering tutoring	2.97	1.22	1.92	1.08

f. Career development and job placement.

SDSU maintains a data-driven and intensive Career Center. Employers who recruit SDSU graduates want efficient centralized services that enable them to reach candidates who match their hiring profiles. In a recent statewide survey of employers who recruit students for professional postgraduate positions, 77% of the employers who worked with SDSU Career Centers strongly or moderately agreed that the employer services provided to them by SDSU career centers had met their expectations. Seventy-eight percent strongly or moderately agreed that "the employer services provided by the Career Center(s) enabled us to meet students/recent graduates aligned with our recruiting needs." Seventy percent strongly or moderately agreed that "Career Center assistance helped us make connections with select faculty, student organizations, and student affairs professionals." Seventy-nine percent strongly or moderately agreed that "The future availability of these services is crucial to our recruiting success." Employers clearly rely on direct recruiting services such as job postings, internship and job fairs, and campus interviews. They also use the consultation and relationship building services that are critical in building ongoing success in the hiring process. From a student perspective, the Career Center provides information about available jobs, advice on preparation of resumes and interviewing skills, and networking opportunities. Hence, the career center serves both the students and industry. We plan to develop a similar Career Center in Georgia to facilitate the goals of providing high quality careers to our graduates and providing a highly educated, qualified workforce for Science and Engineering companies.

g. Student life programs.

Student clubs focused on particular disciplines and career opportunities; student invited speakers who will discuss different careers, new advances in sciences and engineering, issues related to STEM ethics and policy, and other areas of student interest; field trips to local industries, environmentally relevant sites, and arts and culture events; peer-to-peer tutoring opportunities that help students with learning and teaching skills; meetings with Georgia 2020 faculty members to discuss a wide range of topics related to science and higher education; and other functions to promote student interactions outside of the classroom are all important components of an active and fulfilling university environment.

There are considerable data indicating the impact of such academically-related student life activities in the retention and success of students in demanding fields like the proposed STEM curriculum. In addition, these activities offer networking opportunities that enable employers to see the high quality of the program and students, which will enhance industry-university connections and lead to increased access to high quality careers after graduation. Based upon the Georgia 2020: Creating opportunities for inclusive growth report from MCA Georgia, it is clear that such opportunities are currently very rare.

In addition to these academically related student engagement opportunities, we plan to implement other programs that build a sense of culture among the students participating in the joint program. For example, SDSU basketball games are extremely popular with our students, providing both a social outlet and instilling a sense of pride in the university. We could stream the games to a lecture room in Georgia to bring together faculty and students to share the excitement with colleagues in San Diego. The timing of many of these games would allow real-time video streaming. Likewise, we often have special lectures

by prominent authors, business people, and others who are an inspiration for students, and we could stream these lectures to Georgia as well. These lecturers can be provided by real-time streaming, allowing students from Georgia to ask questions from a distance, or can be provided asynchronously to allow students to participate at a more convenient time with a facilitator from the faculty or the community. We also host science and engineering competitions for undergraduate students, and these competitions could be extended to the students in Georgia as well.

h. Study abroad opportunities.

San Diego State University also is deeply committed to international education. Internationalization of the university is central to its mission and plays a major role in SDSU's recently completed comprehensive strategic plan. An important aspect of internationalization is gaining an international experience (study abroad) for as many SDSU students as possible. SDSU has over 30 degree programs that require an international experience for graduation. SDSU is a national and state leader in international education, ranking 23rd in the nation for all universities and number one in California in its category by sending over 1,800 students abroad last year. SDSU has been recognized for its leadership in study abroad by awards from NASFA, Arizona State University, and the American Council on Education. SDSU is the only university in the California State System with a full-time, academic executive solely focused on increasing the number of students studying outside the United States. We will encourage students from the San Diego campus to study abroad in Georgia. In addition to providing a valuable international experience, because all of the courses in our joint programs will be approved by SDSU, the study abroad experience will easily fit with students' educational plans. As Georgian students enrolled in this program are considered SDSU students, they will be eligible to participate in hundreds of study abroad programs.

SDSU students receive scholarship support for study abroad from a number of sources. The most important comes from the students themselves, who voted to impose a study abroad fee resulting in approximately $300,000 per year in perpetuity. Other sources of scholarship support for international activities include about $100,000 per year from the university itself, and numerous scholarships from private sponsors. Almost all students who study abroad from SDSU receive financial assistance.

Support for faculty to develop and participate in international activities come from the university via the Office of International Programs. Each year approximately 60 faculty members receive about $180,000 for activities related to developing and implementing programs that result in students gaining an international experience. The awards are provided through a competitive grant processs. This program has been in existence for over 10 years and during that time over 600 faculty members have received funded to expand SDSU's international activities.

This commitment to internationalization of our university includes bringing students from other countries to the SDSU campus. There are currently students from over 100 countries studying at SDSU. We will welcome students from Georgia to complete part of their degree programs at SDSU, a process that will be seamless because the degrees offered through the SDSU-Georgia program will already be articulated with the degree programs on the SDSU campus. In addition, we will welcome graduates from the Georgia program or other Georgian universities to come to SDSU for master's or doctoral degrees.

20 Task 14 – Private Sector Engagement

New structures to enhance university/industry collaboration in the form of events and advisory committees will be supported. As part of a larger outreach and communication effort, a Georgia 2020 Idea Portal similar to either of the following two programs:

- Shell GameChangers (http://www.shell.com/home/content/future_energy/innovation/ game_changer/)
- Syngenta ThoughtSeeders (https://www.syngentathoughtseeders.com/)

could be developed and maintained to provide ready access to university-scale evaluation of community or industrial ideas and challenges. These programs are industrial portals that accelerate collaborations with external parties and maximize innovation potential for high-performing technologies. They serve as one-stop destinations to share ideas, monitor project status, track submissions and receive feedback.

Industry Advisory boards can provide faculty visibility on current needs and trends to improve curriculum development. Graduates of SDSU's programs have long been full participants in the economic life of the community supported by evolving and relevant curricular offerings. Board members can also sponsor and advise student organizations, act as guest lecturers in the classroom, and mentor individual students. Board members can become advocates for SDSU within their own organizations, helping SDSU take full advantage of its position as an anchor institution for the region. As they become engaged with SDSU and educated about the criticality of SDSU's research and teaching to the future of their own enterprises, board members can become effective allies and generators of philanthropic activity.

By providing a continuously updated innovation resource to the community, Georgia 2020 will simultaneously facilitate ongoing access to research, curricula, student expertise and workforce capabilities to business, government, education, and industry professionals and thought leaders in the innovation economy. SDSU's College of Extended Studies is a core conduit to the community. CES will be engages to design and provide impactful course content that may serve to elevate visibility of faculty research, keep curricular offerings current and relevant for traditional students, and provide new opportunities to support cutting-edge research on campus, and industry-relevant life-long learning opportunities for the communities. CES presents a special opportunity to enhance near-term resources in support of Georgia 2020's student environment, and stream-line provision of curricula, as appropriate. CES will be a full partner in the Industrial Affiliates program to design, develop, and offer on-site, hybrid (synchronous/asynchronous), and online courses, seminars and programs offered to regional companies that have the need to match workforce capabilities with the accelerated rate-of-change for work and life skills.

21 Task 15 – Sustainability

Extending the bachelors degree programs described, Tbilisi State Medical School has signed an MOU with SDSU to cooperate on development of new programs, and discussions continue with Tbilisi State Medical School on developing a masters degree program and advanced certificate programs. Likewise, there are future opportunities to develop joint graduate programs with our other partner universities.

In addition to engineering, growing industrial opportunities in the Republic of Georgia include biotechnology. Two examples of opportunities in biotechnology include human medicine and agricultural biotechnology. Phage therapy is a biotechnology application with a long history in Georgia. The Eliava Institute in Tbilisi is a world leader in the development and dissemination of phage therapy applications for infectious disease. However, there is a growing international industry focused on this market. Hence, maintaining world leadership will require continued research and development, compliance with international regulations for bio-manufacturing, and aggressive international marketing. A workforce skilled in both STEM and international business will ensure continued world leadership in the phage therapy market. Another example of a major opportunity for the Republic of Georgia is microbial biotechnology, including the production of numerous food supplements (including amino acids, vitamins, etc.), therapeutic agents, and probiotics. Expansion of this industry would both

provide a major economic opportunity by exporting these products to other countries, and benefit the agricultural industry by using inexpensive raw materials to produce high value secondary products. The infrastructure, facilities, and expertise at the Richard Lugar Center for Public Health Research will provide valuable collaborative opportunities for developing and optimizing microbial biotechnology related businesses.

We have signed MOUs with the Eliava Institute and the Richard Lugar Center for Public Health Research to collaborate on curricular and research programs as they become feasible under the Georgia 2020 development plan. Likewise, we have had productive discussions with the Ministry of Agriculture about needs and opportunities for agriculture biotechnology applications. Engineering applications in medical devices and mobile diagnosis, and biomedical informatics applications are also robust biotechnology opportunities for economic development that rely upon the highly educated workforce that our program will produce.

Compact Year 7 budget represents a single moment in time that captures projected steady-state revenue from tuition. As noted in the Interim Proposal Technical Evaluation, the business model proposed establishes a provisional "reserve" of unobligated funds by Compact Year 7. These funds will be leveraged to support the continued success of the program through four principal uses: (1) Establishment and development of new degree programs using the successful Georgia 2020 development model – disciplines to be determined in collaboration with partner institutions based on capacity and demand; (2) Construction of new facilities to allow for program expansion; (3) Refresh of existing equipment and supplies to maintain the currency of course offerings; (4) Improving student scholarship aid to ensure long-term access for socially-disadvantaged student groups.

21.1 Student Body Evolution

Multiple coincident conditions exist in the Republic of Georgia that may impact the composition of the incoming student body for the Georgia 2020 programs. First, it is important to account that the program is fully sustainable with space and resources at the proposed tuition and student body levels. However, given the anticipated success and ultimate autonomy of the programs within the partner institutions, it is reasonable to expect that demand for the programs will increase beyond the proposed cap of approximately 2000 students. Given the budget distribution, partner institutions will have sufficient flexibility to reinvest in their own capital requirements and faculty to support a student body at whatever level their infrastructure will support. In the Fall of 2013, SDSU received 54,000 applications for admission, and enrolled 8,600 students into the freshman class. The expectation is that the resources of the partner institutions will ultimately define the size of the student body at their institutions.

Recent reports provided by the partner institutions completed by the Institute for Polling and Marketing (IPM) indicate some substantial indicators for increased participation, especially by women, in the proposed STEM fields. Women were documented to out-perform boys in many primary education categories, but also displayed much lower awareness regarding STEM careers or job opportunities.

At the same time, the Government of Georgia, and industry partners, are making substantial efforts to improve the academic preparedness, and English language ability of the population in general – and success in this arena over the next 7 year will certainly have implications for the future composition of Georgia's national university system student body.

21.2 Faculty Size and Composition

Georgia 2020 has proposed multiple approaches to augmenting the existing faculty development and recruitment activities of the partner institutions. Some of these approaches focus on the qualifications of the faculty (e.g., doctoral fellowships), but other approaches are more straight-forward in terms of providing funding that could be used to hire existing qualified faculty, either within Georgia or internationally. These resources are projected to maximize at the steady-state operation characterized by CY7, and those resources will continue to be available, as approved by the Advisory Board, throughout the projected 20-year partnership. In addition, recent Institute of Polling and Marketing research from Georgia indicate a pipeline of >50% female Assistant Professors at Ilia State and Tbilisi State Universities, suggesting that the professoriate may also undergo a cultural shift in parallel with the student body.

21.3 Long-term Financial Sustainability

Georgia 2020 has developed a secure plan for long-term financial sustainability, based almost entirely on revenue from tuition. Reliance on tuition as the only guaranteed source of funds forces this proposal to maintain a tuition level higher than some partner institutions would prefer. However, to balance the requirements for student access, when the program is successful and reserve revenues are captured, these revenues can be reinvested as student support, or future programs. The implementation of this ambitious program is largely an exercise in risk-mitigation and compromise. As it relates to the long-term financial sustainability, SDSU and the partner institutions have agreed to leverage a broad suite of outreach and enrollment strategies to identify sufficient students that can afford to pay for the value of an accredited and internationally-recognized degree. This strategy is better than pricing tuition too low, which would simultaneously put the entire success of the program at risk, and inadvertently de-value the exceptional opportunity to obtain an accredited degree in the Republic of Georgia, where few other options exist.

22 Task 16 – Implementation Plan

The require MS Project file has been submitted in accordance with the proposal requirements.

23 Summary

Georgia has recognized a critical shortage of STEM professionals graduating from current institutions of higher education. The medium and long-term objectives of this program are to remedy this shortage by (1) providing qualitative and quantifiable improvement of human capital in the Georgian STEM labor workforce, (2) developing a robust STEM workforce to supply high quality technicians and professionals for companies operating in Georgia, (3) enhancing economic growth in Georgia, and (4) increasing employment in companies requiring market-driven technical skills. These objectives will be achieved by offering Bachelor of Science degrees in STEM disciplines, building the capacity of Georgian universities in key STEM disciplines, and facilitating the ABET accreditation of partner universities in Georgia.

San Diego State University (SDSU) is the lead partner in the development of the program, including delivery of curricula, faculty development, supervision of instruction, installation and management of modern instruments and facilities, and implementation of the program. SDSU will collaborate closely with partner universities in Georgia to develop high quality, sustainable degree programs. SDSU will confer bachelors of science degrees to graduates of these programs. Our partner universities in Georgia will likely also confer degrees that are consistent with their curriculum and graduation requirements.

Education has been the catalyst of robust science and technology industries. SDSU provides the educated workforce required for these industries. Georgia 2020 will regularly interact with industry to evaluate needs and opportunities that will ensure students receive the type of state-of-the-art training required for the local industry, thereby providing graduates that are competitive for the best jobs and also ensuring that the graduates optimally serve the Georgian industry.

The economic impact of the robust science and engineering industrial sectors in Southern California provides a clear example of the long-term benefits of investing in higher education. Thus, SDSU offers a unique perspective for the role of STEM education in enhancing economic growth and development, and provides a model for the development of high-paying, white-collar career opportunities for Georgian citizens that will enhance the economy of the Republic of Georgia.

The proposed Georgia 2020 collaborative is built upon a carefully planned, phased-in implementation process that simultaneously takes into account social and cultural conditions in the Republic of Georgia, inherent uncertainties in the development and implementation of such an ambitious and innovative program, and proactively integrates methodology to minimize any potential obstacles or risks to successful implementation and long-term sustainable educational programs ultimately led by the Georgian partner institutions

San Diego State University has a vision for an innovative degree implementation partnership that uses Academic-Industry-Government alliances to transition existing programs to independent internationally-recognized ABET/ACS accreditation. The implementation plan will leverage the core competencies of each partner institution to facilitate the rapid launch of the program. We plan to focus on providing faculty development and mentorship of Georgian faculty at SDSU, renovation of classrooms and laboratories at Georgian universities, equipment acquisition, and outreach/recruitment strategies during the first year of the project, allowing for a seamless progression to enrollment and instruction during Compact Year 2 (CY2).

Based upon input from the MCA-Georgia, Georgian universities, and Georgian industries, SDSU will initially offer four Engineering and Science bachelors degree programs. The lower-division and general education requirements for these six degrees have been integrated to facilitate quality instruction, academic rigor, and educational effectiveness by unifying the first two years of curricula in courses that can then be applied to the degree requirements of one or more degrees. These unified general education and lower-division requirements provide the foundation for upper-division curricula in specific disciplines through advanced courses, laboratory work, and design projects that integrate and apply student the knowledge and skills students have acquired.

The business model for the program proposed establishes a provisional “reserve” of unobligated funds by Compact Year 7. These funds will be leveraged to support the continued success of the program through four principal uses: (1) Establishment and development of new degree programs using the successful Georgia 2020 development model – disciplines to be determined in collaboration with partner institutions based on capacity and demand; (2) Construction of new facilities to allow for program expansion; (3) Refresh of existing equipment and supplies to maintain the currency of course offerings; (4) Improving student scholarship aid to ensure long-term access for socially-disadvantaged student groups.