

ENGINEERS WITHOUT BORDERS

VISION AND GOALS



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EXECUTIVE SUMMARY

Engineers Without Borders (EWB) partners with disadvantaged communities to improve their quality of life through the implementation of environmentally and economically sustainable engineering projects, while developing internationally responsible students. EWB-CSU projects offer students experiential learning in foreign countries, in which they have the opportunity to apply skills learned in the classroom to authentic problems requiring real solutions. While applying these skills, students address current challenges faced by societies, learn about other cultures, break down stereotypes, engage individuals and communities in meaningful ways, and learn new technical skills. With university support, EWB-CSU can develop and deliver a structured program that encompasses a broad range of inter- and extra-university groups to provide students with the opportunity to interact on a global scale and improve the quality of life for everyone involved.

At present, the Colorado State University student chapter of EWB (EWB-CSU) has reached its limit in administrative capability, funding, and faculty support. Addressing the following long-term goals will ensure the sustainability and success of EWB-CSU.

- Increase the long-term sustainability of the organization by obtaining more support from the University and the College of Engineering, and create an administrative position to assist and manage EWB.
- Develop partnerships with other university colleges and organizations through and under the direction of the Engineering Department.
- Enable more and broader involvement with inter- and extra-university groups, including faculty and the professional communities.
- Formally incorporate experiential learning through international development projects into the curriculum.

To meet the above goals, EWB-CSU will need increased support from the College of Engineering and Colorado State University. This increased support can be provided by either expanding EWB to have more College of Engineering oversight or by making

EWB a subset of a “Center for International Development” within the College of Engineering. In the first option, EWB would continue to develop and manage individual projects and run general meetings, but a staff position would be created to manage formal relationships with other colleges, fundraising, public relations, and outreach to alumni and other professionals. The creation of a Center for International Development would combine the best of academia and experiential learning and bring CSU to the forefront of land-grant institutions. EWB-CSU envisions the Center for International Development sponsoring coursework for both undergraduate and graduate students on sustainability, international development, technical skills, appropriate technology, and social and cultural impacts; providing opportunities for student participation in all levels of development projects from design to implementation; broader intra-university, inter-university, and extra-university partnerships; seminars; and research.

Given the positive and enthusiastic response from students in support of international development, EWB would prefer to see a Center for International Development be created within the College of Engineering. EWB understands this would be a resource intensive and lengthy process, and may not be feasible in today’s university climate. If the creation of a Center for International Development, of which EWB would be a subset, is not feasible, then EWB recommends increased College of Engineering support.

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1. INTRODUCTION

Engineers Without Borders-USA (EWB-USA) partners with disadvantaged communities to improve their quality of life through the implementation of environmentally and economically sustainable engineering projects, while developing internationally responsible students.¹ A non-governmental organization established in 2000, EWB-USA partners students and professionals with international aid projects addressing community needs including the design and construction of water, waste-water, sanitation, energy, and shelter systems. The students' goal is to incorporate and train the community in all phases of the sustainable projects to ensure ownership, appropriateness and long-term effectiveness. The Engineers Without Borders chapter at Colorado State University (EWB-CSU) is reaching these goals through projects in El Salvador, India, Nepal, and Tanzania.

At present there are more than 6 billion people on planet Earth; in 25 years there will be 8 billion, and 97% of the growth will be in developing countries.

- Over 3 billion (half the world's population) have inadequate access to clean water and sanitation
- 6,000 people, mostly children, die each day due to unsafe drinking water, inadequate sanitation, and poor hygiene
- Over 80% live in poverty
- Over one-third die each year from famine
- One-third have no electricity

The scale of this problem requires a new way of thinking, and a long-term approach. As important as international aid programs are, many community problems cannot be solved by short-term international aid programs. These problems will require the dedication of a new generation of professionals, working hand-in-hand with local communities, social scientists, economists, businesses, human rights organizations,

¹ For more information about the national organization, EWB-USA, please see www.ewb-usa.org.

other non-government organizations, and international development organizations. EWB assists in training a new generation of professionals through hands-on involvement in new and ongoing national and international development projects.

1.1. Our Values

- *We believe in change* that can contribute positively to the communities in which we work, change through common action in intransigent systems, and that changes started now will provide new solutions over time.
- *We believe in the culture and people in host communities* who define the development projects and ensure ownership, appropriateness, and long-term effectiveness – people who can: solve their own problems if they are aware of the technical options, can build new skills, assist significantly in the solution through labor, financial, and in-kind contributions.
- *We believe in partnerships* with a broad cadre of institutional, academic, development, and professionals who are willing to assist in building toward a more equitable and sustainable world.
- *We believe in environmentally sustainable projects* that are symbiotic with the environment, society, and culture.
- *We believe in education* that will develop a new generation of students who will benefit from experiencing the many facets of solutions to problems in developing communities, which lie beyond the technical skills obtained in their curriculum.

We also believe that the non-engineering components of local needs are often more complicated than the engineering aspects, and seek to instill this understanding within the engineering students that are an integral part of the entire process.

1.2. Our Vision

EWB's outward vision is of a world where all people have access to adequate sanitation, safe drinking water, and the resources to meet their other self-identified engineering and economic development needs. The objective of all these activities is not only to contribute to new and ongoing development projects in an effective way, but

to expand the dimensions of experience for emerging and practicing professionals. It is our vision that this is a primary path to achieving a more sustainable world, without suffering the consequences of development projects that are socially, culturally, or economically inappropriate. Today's students have a central role in building a sustainable future; in fact, they have an obligation to provide leadership in this direction.

EWB engages developing communities in resolving particular infrastructure needs that the community itself has identified. EWB involves students in every step of the process, enabling them to learn firsthand about solutions to the problems of the developing world.

2. CURRENT ORGINIZATION

2.1. *Administration of EWB-CSU*

Engineers Without Borders is a recognized student organization at Colorado State University. EWB's primary function as a student organization is to provide students with the opportunity to participate in international development projects.

In addition our projects and project meetings, EWB has general bi-monthly meetings, officer meetings, fundraising activities, and student outreach events. In the future, EWB plans to incorporate technical and non-technical training sessions and local service-learning projects into our activities.

EWB-CSU is non-discriminatory and welcomes all majors and backgrounds. A voluntary membership of \$10 a year is asked for in order to help cover administrative costs. EWB-CSU is run and maintained by six student officer positions. A brief description of each officer is provided below.

- President
The main role of the president is to oversee and maintain EWB-CSU. The president is also responsible for making sure our projects are running smoothly and efficiently.
- Vice President
The vice president is responsible for filling in for the president if he or she is unavailable and for coordinating all general meetings and activities.
- Secretary
The secretary is responsible for documenting meetings and assisting in external communication and publicity.

- Treasurer
The treasurer is responsible for managing EWB accounts and coordinating and assisting in fundraising activities
- Technology Chair
The technology chair is responsible for designing and maintaining the EWB-CSU website and organizing technology for needed events.
- Project Manager (India, El Salvador, Nepal, and Tanzania)
Each project manager is responsible for managing one of our development projects.

In addition to the student officer position, EWB has a faculty advisor who assists in the administration of EWB. The current faculty advisor is Dr. Brian Bledsoe, an assistant professor in the Civil Engineering Department.

2.1.1. Project Management

Each EWB-CSU project has a designated project leader who is responsible for overseeing the project and delegating work within the project team. Each project team also has at least one faculty or professional mentor to help with the technical design and feasibility of the project.

Teams of students can work on a project as an extracurricular activity, as part of a senior design course, or to obtain independent study credit for the project. At the moment, few students have obtained credit for the work in EWB projects; however, two project teams are currently working with the Civil Engineering senior design program to obtain credit for their work. To date, no formal relationship has been established with the College of Engineering; project teams interested in obtaining credit for their work are evaluated on an individual basis.

Projects can be obtained from the national organization or from outside sources. If a project is found from another source besides EWB-USA, then approval is sought from EWB-USA. Before site assessment trip or implementation, each project team must give a presentation to EWB-USA to seek approval for the project plan. EWB-USA offers minimal technical advice and funding for the projects. Each project is also assigned a project liaison in order to facilitate communication with the national organization.

Currently, each project team is responsible for its own funding. Funding is often one of the most difficult aspects of the projects. Students often are required to pay their own way, limiting participation to students that can raise enough money to pay for the travel.

2.2. Current Projects

At CSU, there are currently four projects located in El Salvador, India, Nepal and Tanzania. Another project may start in the Dominican Republic. Brief descriptions of EWB-CSU's four main projects are listed below.

- El Salvador

La Laguneta and El Chile are rural villages in El Salvador with a combined population of 1200 people. Each family is rationed approximately 10 gallons of water per day during the five month dry season. The women of the village are responsible for pumping and carrying 55 pound buckets of water back to their homes on their heads. This is all the water that each family (around 5-7 people) may use for cleaning, cooking, and bathing each day. EWB-CSU is working with the community to find a way to increase the water supply for the village. We have made two data collection trips to the villages of La Laguneta and El Chile and are currently ready to implement the project in March of 2005.

- India

Located northwest of Calcutta, the project area consists of 51 villages that are severely impacted by drought. It is not uncommon for village wells to be completely dry by May, forcing women to walk over 4 kilometers twice a day to

get water from the river for their families. EWB-CSU is working with the villages of Juri and Pitati to provide a safe, adequate water supply. In June of 2005, a three person team traveled to India for data collection and site assessment. We are currently working on project design, and will begin implementation in 2006.

- Nepal

EWB-CSU and EWB at Tribhuvan University in Nepal jointly entered the Daimler-Chrysler Mondialogo Competition last December with their design of improved cook stoves for use in rural Nepal. The Mondialogo team sent three students to Germany over the summer to present the cook stove design and has been awarded \$18,000 to spend on the project. EWB-CSU is preparing to send several students to rural Nepal this December to begin implementation of the project.

- Tanzania

EWB-CSU is joining Saint Paul Partners for a project in Nyanzwa, Tanzania to design and build a drinking water treatment plant serving a population of 4,500 people. The Tanzania project will be part of Civil Engineering Department's Senior Design class curriculum.

2.3. Problems with Existing Structure

2.3.1. Lack of administrative capabilities to manage EWB as students

EWB-CSU is expanding as students begin to see the success of our projects and the opportunities they offer. Many students, from varied disciplines, are currently working on EWB projects and many more have expressed interest in becoming involved. With the enormous influx of new members, the size of the organization is growing faster than its management capabilities.

Because the organization is run by full-time students, the amount of time that each officer can spend managing EWB is limited. A lot of human resources are required to

keep our projects running smoothly and figure out where to place the influx of students with our limited resources. Management is human resource intensive, and currently we are unable to provide guidance to new members.

In addition to the lack of human resources and time, EWB lacks the funds to provide the services each project requires. EWB requires funds for general meetings, newsletters, thank you letters, fundraising events, and more. The funds available for administration are very limited. For this reason EWB recently initiated a yearly \$10 membership fee to help with administrative costs, but these limited fees will not be enough to meet our funding needs.

2.3.2. Project Funding

One of the most difficult aspects of each project is providing funds for travel and implementation. Currently no consistent, long-term source of funding has been found. Although fundraising efforts have been made, results have been limited compared to the amount of money required for a typical project. The majority of student travel funds have come from the support of our students and students' family members.

In order to find consistent funding for our projects, time will be needed to write grant proposals, talk to businesses, make presentations, send out newsletters, etc. As mentioned previously, EWB-CSU already struggles to meet our current administrative requirements, making it difficult to search out more consistent sources of funding. Currently, EWB has more projects than we are capable of funding or finding funds for.

The College of Engineering has provided minimal financial support and has not been motivated to help EWB find funding for its projects. Within the College of Engineering, the Civil Engineering Department has been most supportive, donating \$600.

2.3.3. Faculty support

It is critical to project success that a mentor be found to advise the projects technically. As students, our knowledge is limited, making it important to have support from faculty and professionals.

Currently, faculty support has been limited due to the amount of time that faculty can spend on extra projects. Project mentors are also needed to travel out of country with students. Because of work requirements, faculty mentors are infrequently available to do this.

3. EWB-CSU CONTRIBUTIONS TO CSU

By expanding the current role of EWB-CSU within the university structure, CSU can further meet the goals it has outlined in its Strategic Plan. EWB-CSU projects offer students experiential learning in foreign countries, in which they have an opportunity to apply skills learned in the classroom to authentic problems requiring real solutions. While applying these skills, students have the opportunity to address challenges faced by societies, learn about other cultures, break down stereotypes, engage individuals and communities in meaningful ways, and learn new technical skills. Participating in EWB-CSU projects helps students develop accountability, civic responsibility, integrity, creativity, diversity of thought, compassion, sensitivity, and pride in their work. With university support, EWB-CSU can develop and deliver a structured program that encompasses a broad range of inter- and extra-university groups to provide students with the opportunity to interact on a global scale and improve the quality of life for everyone involved.

3.1. Strategic Goals:

By expanding the current role of EWB-CSU within the university structure, we believe we can help CSU meet the goals it has outlined in its Strategic Plan. The unique, “hands-on” experience of participating in a EWB-CSU project will give students the skills and global perspective required to be successful in today’s society. EWB-CSU can contribute to the following core academic commitments: teaching; research; and service and extension. EWB can also strengthen CSU’s commitment to culture, connection, and community.

3.1.1. CSU Initiative 1: Teaching

In today’s competitive, global society, university graduates must have advanced skills and a global perspective to be successful. CSU has committed to providing a distinct educational experience that reflects the excellence of CSU’s standard for teaching among public research universities. EWB-CSU can help CSU meet this goal by providing the following:

- Through *experiential learning*, EWB-CSU can provide students the opportunity to learn and apply classroom skills to real world problems. Because projects are results-oriented, students must use their knowledge by developing a working, sustainable solution to complex problems. Problems have left the abstract reality of the classroom, and moved into the tangible reality of life.
- The situations EWB-CSU works to improve encompass more than traditional engineering. Students must consider the *technical, social, economic, environmental, and cultural effects* of their proposed solutions before they can be implemented. To this extent, students of all majors are required to work together to solve the myriad facets of a complex problem affecting a community. This leads to the *technical exchange* of ideas, and teaches students to consider impacts beyond the disciplines they study. This helps students develop a richer and more complex viewpoint than the traditional classroom experience usually provides.
- Working in another country introduces students to new cultures and broadens their own perspective on life. By working internationally, students develop *sensitivity to other cultures*, better preparing them to function in a global workplace. This will also help create a campus culture that is more supportive of *student diversity*.
- Participation in a project requires a student to learn to communicate with a variety of entities, including local villagers, international aid organizations, and professional groups and businesses. Students have to effectively communicate technical ideas with non-technical groups of people. Varying formats of *communication* are used, such as group meetings, presentations, and project reports.
- *Teaming skills* are incorporated on all levels of EWB-CSU projects. Each project requires a diverse team of students who must partner with mentors, funding organizations, government, and/or other NGOs to successfully implement a solution.
- *Faculty opportunities* are numerous and diverse within EWB-CSU. Faculty are needed as advisors and mentors to student teams. This provides faculty a

rewarding forum where they can teach and see the results of their teaching. Projects are also an opportunity for experiential teaching.

- EWB-CSU is a high-quality program that recruits prepared, motivated, well-rounded students. During *student outreach* activities, officers have been told by both incoming undergraduate and graduate students that EWB-CSU's active chapter was a major factor in their decision to attend CSU. Many incoming students are looking for a supportive environment where they can apply their skills to positively affect humanity while still attending school.

3.1.2. CSU Initiative 2: Research

CSU is an internationally recognized leader in research. EWB-CSU offers opportunities for need-driven research that can profoundly impact developing communities. For example, based on the need for indoor lighting in Nepal, CSU researchers and EWB-CSU members have developed a novel cook stove that provides lighting and reduces indoor air pollution. The project has grown in scope and includes a partnership between CSU's College of Engineering and College of Business, and Tribhuvan University in Nepal. As EWB-CSU looks for innovative ways to meet the needs of developing countries, we will need the support of CSU's academic community.

3.1.3. CSU Initiative 3: Service and Extension

CSU has a longstanding commitment to service and extension in Colorado, the USA, and the world. EWB-CSU's commitment to developing communities and the services we provide will enhance CSU's commitment to excellence in service.

- EWB-CSU offers rewarding and meaningful ways to engage alumni as mentors and advisors. Because project teams consist primarily of students, we need the experience and guidance of practicing professionals.
- The services EWB-CSU provides to developing communities build economic prosperity and improve the quality of life.

- The situational complexity of EWB-CSU projects fosters global partnerships. Partnerships with in-country aid organizations and universities are often employed to maintain project continuity while EWB-CSU members are not in country.
- CSU has committed to provide 25% of students with opportunities to participate in an international learning experience, focused on strategic areas including Latin America, Asia and India. Participation with EWB-CSU is one way the university can meet this goal. A core value of EWB-CSU is educating responsible students through international aid work.
- EWB-CSU projects act as a global portal for the CSU community by providing a framework for CSU faculty, students, and staff to work with developing communities worldwide.

3.1.4. CSU Initiative 4: Culture, Connection, Community

EWB-CSU is formed by group of highly motivated students willing to take the initiative to find solutions to difficult situations. Communities in developing countries depend on our students to find solutions to the problems they face in everyday life. The high expectations of those we help lead to quality work that EWB members take pride in. Our standard of excellence also leads to respect for the greater CSU community. Along the way, team members learn to become leaders and respect the skills they develop at CSU. Our commitment to helping others creates a culture where humanity is respected.

3.1.5. CSU Initiative 5: Diversity

Experiencing varied cultures in foreign countries confronts students' stereotypes, teaching them to consider life's diversity with an open mind. The awareness students cultivate while traveling abroad promotes awareness within the CSU community, leading to dialogue and action around diversity of thought, expression, ideology, and culture.

4. LONG-TERM VISION AND GOALS

The CSU of chapter of Engineers Without Borders has identified a number of long-term goals it would like to address. At present, EWB has reached a limit in its administrative capabilities. We believe that addressing these goals is fundamental to the long-term sustainability and success of this organization.

4.1.1. Increase the long-term sustainability of the organization by obtaining more support from the College of Engineering and University, and create an administrative position to assist and manage EWB.

As mentioned previously, EWB-CSU has currently reached a plateau in its management capabilities. We believe the long-term sustainability and success of the organization at CSU will be greatly increased if the College of Engineering and university give more support to EWB. There are several ways that EWB envisions this support (see below). A key point in university support is the creation of an administrative position to assist management of EWB, alleviating the current strain on the student administration.

4.1.2. Develop partnerships with other university colleges and organizations through and under the direction of the Engineering Department.

EWB-CSU believes that partnering with a wide range of colleges within CSU is essential to the success of the organization. Students must consider the technical, social, economic, environmental, and cultural impacts of their proposed solutions before they can be implemented. Students are also required to manage, implement, and find funding for our projects. This format encompasses much more than traditional engineering problems. For these reasons, EWB-CSU believes that partnering with a wide range of colleges and departments at CSU, including anthropology, sociology, business, foreign language, and natural resources, will allow for the complex problems affecting a community to be solved. It will also give students a richer and more rounded educational experience.

4.1.3. Enable more and broader involvement with inter- and extra-university groups, including faculty and the professional communities.

When facing complex development projects, having support from a wide range of professionals and students is very important. Faculty and professionals that can mentor EWB projects are essential to each project's success. EWB would like to facilitate the involvement of faculty and professionals to advise our projects. EWB also believes that partnering with other organizations on and off campus will help facilitate our projects, such as the Anthropology Club, UNICEF, and more.

4.1.4. Incorporate experiential learning through international development projects more formally into the curriculum.

Through experiential learning, EWB-CSU provides students the opportunity to learn and apply classroom skills to real world problems. Because projects are results-oriented, students must use their knowledge by developing a working, sustainable solution to complex problems. Problems have left the abstract reality of the classroom and moved into the tangible. By incorporating experiential learning more formally into the curriculum, the university and EWB-CSU can better provide students with the opportunity to learn by participating in international development projects and learning about sustainability, international development, technical skills, appropriate technology, and social/cultural impacts in their coursework.

5. OPTIONS FOR GROWTH

Within CSU, student participation in EWB has increased dramatically in the past year. Within just the last two months, two new projects have been started by student members, bringing the total number of EWB projects to five. Unfortunately, EWB's organization is designed to support only a small core of dedicated students working on two or three projects. The rapid growth in participation has led to an overextension of EWB resources, and we currently do not have the capacity to meet our growing needs. With all of our officers also working on EWB projects and attending school, the personnel hours required for management and oversight by students are not available. In addition to this, there are not enough faculty advisors for projects, and our current faculty advisors do not currently have the time necessary to rigorously oversee projects. Finally, with the advent of two new projects, already inconsistent and limited funding will be stretched even further. Despite these concerns, EWB-CSU feels it has much to offer faculty and students both engineering- and university-wide. However, for EWB to provide the quality experience it has become known for, these concerns must be addressed. To this end, we propose three options for growth:

5.1.1. Expand EWB to have more College of Engineering oversight

In the first option, EWB-CSU's structure would remain primarily as it is, but with increased College of Engineering support. In this scenario, EWB would continue to develop and manage individual projects and run general meetings, but a staff position would be created to manage formal relationships with other colleges, fundraising, public relations, and outreach to alumni and other professionals. EWB would also like professors to be given releases from their teaching and research responsibilities to act as professional advisors to EWB projects. Formal financial support from the college would be required to support the new staff position and growing projects. Finally, EWB would like to develop and formalize an independent study system in which students receive credit for their work.

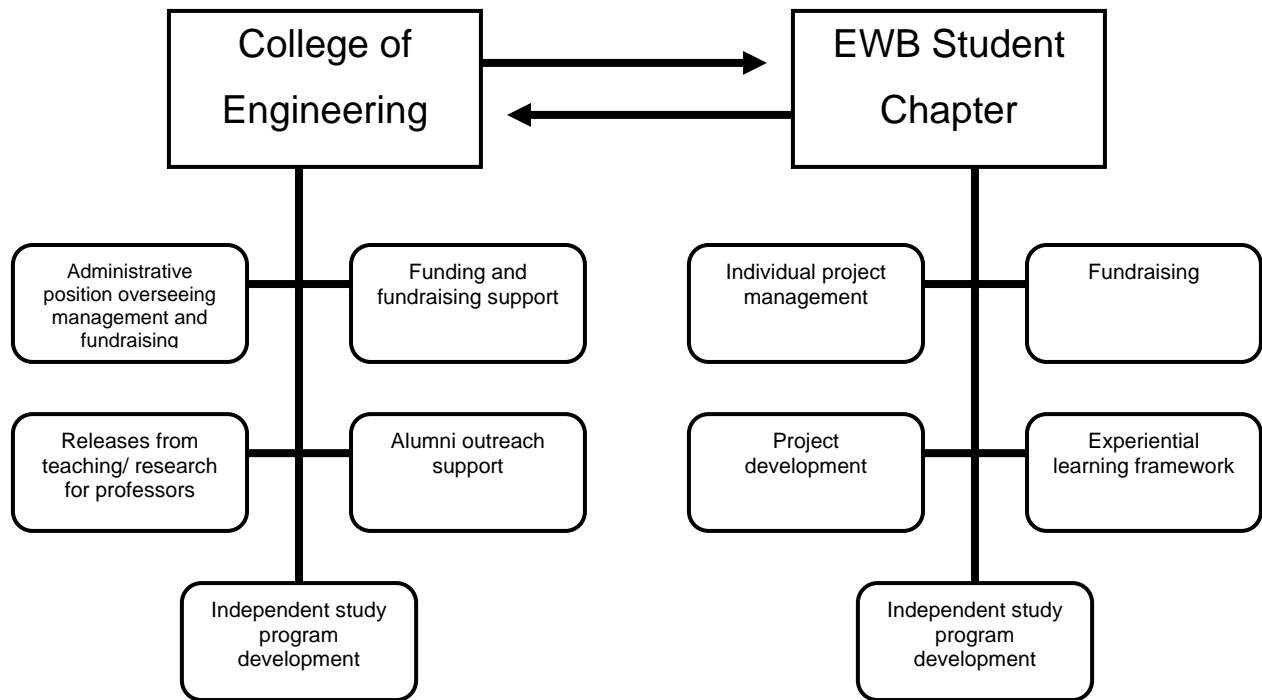


Figure 1: Division of Responsibilities

5.1.2. Make EWB a subset of a “Center for International Development” within the College of Engineering

In the second option, the best of academia and experiential learning would be combined to create a “Center for International Development” within the College of Engineering. In this case, EWB would be only a small part of a broader goal to educate students about international development work. We envision the Center for International Development sponsoring coursework for both undergraduate and graduate students on sustainability, international development, technical skills, appropriate technology, and social and cultural impacts; providing opportunities for student participation in all levels of development projects, from design to implementation; broader intra-university, inter-university, and extra-university partnerships; seminars; and research. The development of such a center would meet the increasing desire of students to learn about all aspects of international development and would go beyond the current International Certificate by providing unique classes, experiential learning, seminars and research opportunities. It would also bring the College of Engineering to the forefront of educational institutions working to meet today’s global challenges. As a subset for the Center for International

Development, EWB would provide one of several opportunities for students to gain the “hands-on” experiences they are beginning to require in their education. See Figure 2 for a graphical representation of how the Center for International Development would be organized.

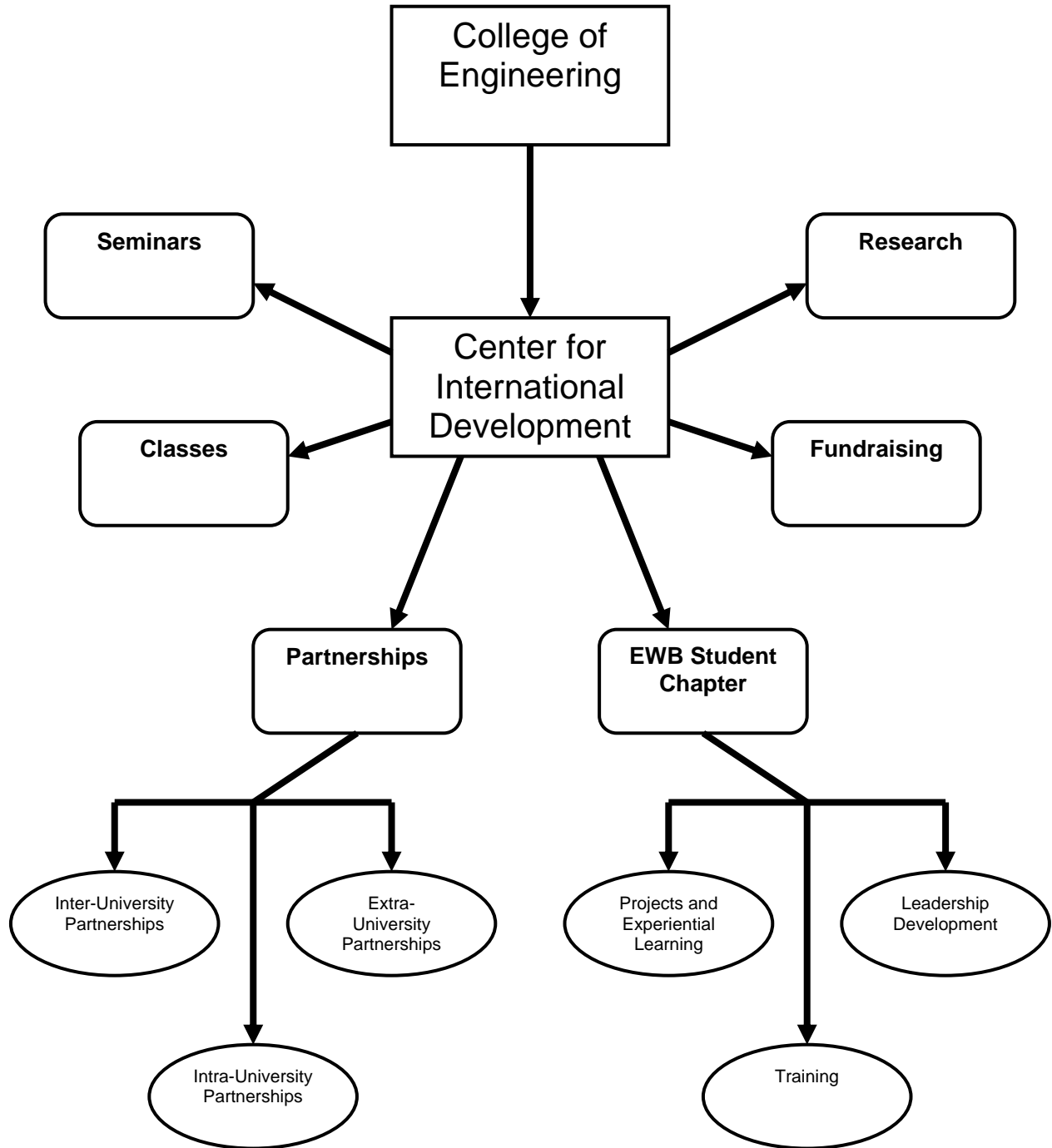


Figure 2: Organizational Structure for the Center for International Development

5.1.3. Limit EWB projects to a scale students can manage with minimal support

If the College of Engineering or CSU is unable to provide the support necessary for growth, EWB would be required to scale the number of projects to a level students could manage with minimal college support and still provide the quality of experience EWB is becoming known for. Put quite simply, EWB lacks the administrative and funding capabilities to meet growth demands. Under this scenario, EWB would limit itself to 2-4 projects, effectively limiting the number of students who participate. In addition to this, EWB would have minimal formalized relationships with colleges beyond the College of Engineering, would not sponsor any senior design projects or capstone experiences, and would require students to individually seek independent study credit for projects.

6. CONCLUSIONS AND RECOMMENDATIONS

Given the positive and enthusiastic response from students in support of international development, EWB would prefer to see a Center for International Development be created within the College of Engineering. However, EWB understands this would be a resource intensive and lengthy process, and may not be feasible in today's university climate. If the creation of a Center for International Development, of which EWB would be a subset, is not feasible, then EWB recommends increased College of Engineering support.