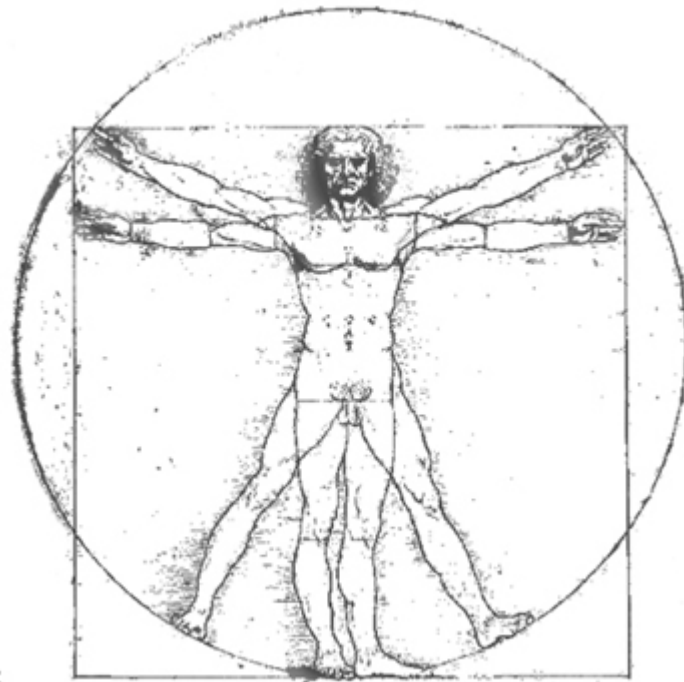




WESTERN ENGINEERING "ENGAGING THE FUTURE"



OUR RENEWED ACADEMIC PLAN AND BLUEPRINT FOR EXCELLENCE

(October 2006)



1. Introduction

The renewed Academic Plan of the Faculty of Engineering at The University of Western Ontario has been under development since February 2005. Inspired by the previous University Strategic Plan “Making Choices” and by the Draft Report of the Task Force on Strategic Planning “Engaging the Future”, this renewed plan articulates the evolution of the vision of Western Engineering towards becoming a leading research-intensive school, broadly recognized as one of the very best, by setting new standards for excellence in engineering education and research, building upon the existing strengths and synergies within the larger University community.

In 2004, a broad consultation was initiated by soliciting written input from faculty and staff in relation to what could be considered the “top three priorities” for the Faculty from their individual perspectives. The high response rate and positive and constructive comments that were received provided guidance to the formulation of an initial vision. On March 10, 2005, the Dean presented a general outline of this vision of the future of the Faculty to Western Engineering Faculty Council. At the meeting, a motion in support of this vision “in principle” was unanimously carried. Subsequently, each Department was asked to engage in a broad consultation with all stakeholders, and to formulate Draft Departmental Academic Plans. In early September 2005, a document entitled “Western Engineering’s New Academic Plan. Part 1: The Framework”, illustrating the general vision presented earlier, was distributed to Faculty Council. The overall vision was also presented to the Advisory Council for Western Engineering (ACWE) at the end of September 2005, where it received a full endorsement. During 2006, consultations continued, including one-on-one meetings between the Director of Administration and individual staff members (42 participated) to review and obtain comment on the direction of the Faculty, and the Departmental Plans were revised guided by the Draft Report of the Task Force on Strategic Planning “Engaging the Future”. Each of the Departments held special retreats to discuss and formulate individual plans. Once the Departmental Plans became available, extensive consultation took place at Dean’s Council. This document represents the culmination of all these consultations and articulates the blueprint for excellence to guide Western Engineering’s developments over the next four years.

This document was approved by Faculty Council on October 26, 2006, and unanimously endorsed by the Advisory Council of Western Engineering (ACWE) on October 27, 2006.

2. Setting Directions

Western Engineering Trends

Western Engineering is all about people. A snapshot of the current status of the Faculty (November 1, 2006) includes 81.5 faculty positions involved in teaching and research and 5 Limited-Term teaching faculty positions, 54 full-time staff members (excluding UMS, BLWTL, and research positions), 1,268 FT undergraduate students, and 464 graduate students (including 20 grad students in the Biomedical Engineering program supervised by Engineering faculty members). The faculty complement includes 11% female faculty members, whereas women account for 16.4 % and approximately 20% of the undergraduate and graduate student populations, respectively.

Guided by the 2002 Academic Plan, Western Engineering has undergone a major unprecedented growth during the past 4 years, both quantitatively and qualitatively; we have grown in size, as a result of new central investments and very significant fundraising successes, in infrastructure (new buildings, including the:

Thompson Engineering Building, Classroom Addition, Graduate Student Building attached to the Boundary Layer Wind Tunnel, as well as significant renovations of the existing infrastructure), in quality (both in term of undergraduate and graduate students), in research intensiveness (we have substantially increased the research funding and we have been extremely successful with the CFI, OIT and ORDCF infrastructure and operating programs), in impact (we have become a major player at Western and within the national engineering community, and, in selected areas, in the international scene) and, consequently, in overall recognition.

Western Engineering has essentially accomplished all the goals established in the 2002 Academic Plan and, in selected areas, surpassed them. For example, although we have only increased the faculty complement from 78 to 81.5 faculty members with teaching and research responsibilities and 5 Limited Term full-time teaching faculty (for a total of 86.5 teaching positions), as a result of the decline in undergraduate enrolment (from 1,537 to 1,268) the student-to-faculty ratio has declined from 19.7 to 14.6. The combination of declining undergraduate enrolment and the creation of additional teaching positions has allowed us to

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achieve the objective of reducing the average teaching load from 4 to 3 half-courses per faculty member. On the other hand, over the past 4 years, our research intensiveness has increased very significantly, with the level of research expenditures increasing from \$ 190,000 per faculty member in 2002 to over \$ 240,000 in 2006. Western Engineering has continued to maintain its record as the most successful Faculty of Engineering in Canada in terms of CFI success. This is a remarkable accomplishment! Similarly, Western Engineering ranked 7th in Canada in relation to the number of refereed journal publications cumulatively published between 1999 and 2004, behind much larger Engineering schools (Toronto, Alberta, UBC, McGill, U. de Montreal and McMaster) and ahead of many other

larger prestigious schools (Queen's, Calgary and Laval). Between 2002 and 2006 the graduate enrolment increased by 55% (from 300 to 464 students), corresponding to an increase from 3.84 to 5.69 graduate students per faculty member. Such drastic increase has been facilitated by the creation of the stable and predictable funding mechanism resulting from the establishment of the Western Engineering Scholarships. Recognizing that the faculty members were aspiring to an increased research intensiveness, Western Engineering has decided to strategically utilize the increased financial resources resulting from the Enrolment Contingent Funding (ECF) and Graduate Expansion Fund (GEF) to complement the increased level of WGRS funding from the Faculty of Graduate Studies and to direct all these resources to support graduate students rather than to increase the faculty complement. As a result, the level of financial resources made available by Western Engineering for graduate student support has increased from approximately \$ 1.3 millions to over \$ 3 millions over the past 4 years. Finally, the University has provided a slight increase to our base budget and allowed the faculty to reach a balanced and, based on past and current successes, a sustainable financial position.

The current trends and driving forces that are influencing the development and evolution of the new Academic Plan of Western Engineering for the next four years, as assessed by broadly surveying both faculty and staff, include:

- 1) completion of the recruitment of all approved faculty and staff positions, consolidation of our remarkable growth, and development of the full potential, ambitions and aspirations of faculty and staff;
- 2) selective expansion in specific areas of growth and strength;
- 3) targeted recruitment of outstanding new students, faculty and staff while aiming at an increased number of female faculty and students;
- 4) increased ambition and desire for higher quality throughout;
- 5) increased scope, enrichment and quality of undergraduate programs;

- 6) increased interest in, and commitment to, leading edge research of great impact and wide recognition;
- 7) desire to better enable faculty members to establish distinguished reputation in teaching and research ;
- 8) desire for increased professional development opportunities for staff members and improved integration and active participation of dedicated, knowledgeable and professional staff members in the teaching, research and service missions of the Faculty;
- 9) strong interest in encouraging and promoting interdisciplinary and collaborative research across the University and beyond;
- 10) declining trends in undergraduate student numbers and widespread competition for the very best students;
- 11) excellent research climate and funding opportunities, locally, nationally and internationally;
- 12) clear goals of the University and the Province of Ontario to expand graduate education, research intensiveness, innovation opportunities and outcomes, and the overall quality of the graduate students and programs;
- 13) outstanding graduate student support packages (WES) and predictable funding arrangements established by Western Engineering resulting from a transparent University-wide funding mechanism;
- 14) a wide recognition of the importance of internationalization of our activities at all levels, and a unanimous recognition of the enormous values created by diversity and gender balance;
- 15) strong desire for a more professional and improved quality of the workplace, building infrastructure, and associated facilities;
- 16) an unparalleled desire to develop a stronger sense of being part of the same proud “family”, willing to share a strong and ambitious vision, and to jointly celebrate successes and accomplishments;
- 17) desire to enhance the image of Western Engineering and gain greater recognition both nationally as well as internationally; and
- 18) need to establish visible measures of success so that faculty, staff and students can monitor how we are collectively progressing towards the goals and the ultimate vision.

Our Aspiration: the New Vision Statement

Western Engineering aspires:

“To become one of the leading Canadian research-intensive Engineering schools, internationally recognized for the excellence and impact of its undergraduate and graduate education and research and for providing students with the best possible student experience, by focusing on

- *top quality and enriched undergraduate programs (Western Engineering Plus), and*
- *qualitative and quantitative expansion of graduate education and research activities”.*

Goals and Ambitions

To achieve our aspiration, we will:

- Build on our strengths in undergraduate education by enhancing the best student experience through expanded student engagement and enriched learning experiences;
- Expand and enrich our graduate education programs and the overall graduate student experience and professional growth;
- Increase our research intensity and impact through initiatives aimed at building our research capacity, impact and recognition in areas of established and emerging strength;

- Secure the appropriate human, physical and financial resources and make a renewed effort to mentor, support, encourage, and recognize our students, faculty and staff, and to create a professional, welcoming and hence more productive work environment, conducive to satisfaction and success.

Principles

As we develop the blueprint for excellence for the next four years, individual faculty and staff members and the entire Western Engineering community agree to adhere to the twelve enduring principles articulated in “Engaging the Future”: excellence, selectivity, education for leadership, academic freedom, Western’s people excellence and success, diversity, societal responsibilities, accountability, autonomy, innovation, partnerships and openness.

Measuring Our Progress

Since our plan stresses a strong desire to improve quality, we commit to clearly identify a variety of complementary quality indicators of performance and to continuously measure the progress toward our aspirations through a comprehensive data gathering of such measures and their dissemination. All appropriate data will be collected, analyzed and compiled, and reports will be produced illustrating the various performance indicators and their evolution, to establish benchmarks and trend lines for the next four years.

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In this document, we will present a list of specific goals at the end of each section. For each goal, we will develop appropriate metrics and commit to gather, compile, analyze and publish these indicators of progress towards our goals.

3. Enhancing the Undergraduate Student Experience

Undergraduate Education: Western Engineering Plus

The Faculty of Engineering strongly supports the concept of enriched engineering education, designated as “Western Engineering Plus”, which aims at providing students with unique and outstanding opportunities to challenge themselves beyond the regular course of studies and, overall, to increase the direct student engagement in learning, resulting in a better student experience. This enrichment involves participation in a variety of programs that we have created over the past 5 to 8 years, including concurrent degrees, enhanced design courses and project-based learning, summer research activities and the seamless integration of undergraduate and graduate education (through the Accelerated Master program or the MEng programs), industrial work experiences (Summer Co-op and Internships), international experiences, program enrichments (Technological Entrepreneurship Certificate program), as well as a variety of extracurricular projects and clubs. The ultimate objective of Western Engineering is to offer the best possible education and experience to the new generation of engineering leaders, and to differentiate our offerings from those of schools that focus almost exclusively on the technical education and training.

The Leonardo da Vinci Image

Western Engineering has the ambition to offer a modern form of education that prepares graduates to be effective members of the 21st century global society, independent of the professional careers that our graduates wish to undertake. Western Engineering does not want to exclusively focus on the education and training of graduates that will become Professional Engineers. Indeed, Western Engineering wishes to educate the new generation of engineering graduates that, in addition to becoming Professional Engineers and undertaking technical careers, will also have aspiration of becoming leaders in business and in the community, managers, physicians, lawyers, bankers, researchers, scientists, politicians, economists, writers, architects and artists. The “Leonardo da Vinci” image, now reflected in the name of our main social area and food court, best reflects the aspiration of our programs, i.e. breadth and quality. We strongly believe that this image will continue to inspire innovative programs and enriching activities that will truly contribute to providing “the very best engineering student experience” in the years to come, and to recruit greater numbers of top quality and ambitious undergraduate students and increased numbers of female students.

In order to achieve this vision, within the current climate and on the basis of the current expectations, we must aim at a student intake of approximately 330 to 350 undergraduate students of high quality (i.e. with entrance averages greater than, or equal to, 82%). A steady state undergraduate enrollment of this size will bring the total undergraduate student complement to approximately 1,230-1,250 students in four years. In this regard, an aggressive communication and recruitment campaign is required to make the features and attractiveness of Engineering Plus programs visible to prospective top quality and ambitious students.

Our undergraduate programs are subjected to periodic reviews and rationalization, new programs may be explored, while unpopular programs must be phased out. All undergraduate Engineering programs are fully accredited by the Canadian Engineering Accreditation Board (CEAB), which requires a periodic review every three to six years. Western Engineering aims at achieving the top CEAB accreditation for all our undergraduate education programs (with the review scheduled for November 2006 and the final Board deliberation expected in June 2007).

In the upcoming year, as appropriate performance data will become more readily available, we will consider participating in the surveys coordinated by the American Society for Engineering Education (ASEE) and benchmark ourselves in relation to the best Canadian and American Universities.

In 2004, Western participated in the National Survey of Student Engagement (NSSE). This survey allowed the direct comparison of our student experiences with a large number of participating Universities in Canada and in the United States. In the first survey, Western fared poorly in a number of critical areas, including “enriching educational experiences” and “student-faculty interaction”. However, when Western Engineering requested and received the segregated data, that is, the data relative to Engineering schools only, the results showed that our indicators are either comparable or better than those of the best Canadian engineering schools. It will be very important to continue to benchmark our Faculty’s performance in student-related activities and services and measure our success.

Western Engineering wishes to educate the new generation of engineering graduates that, in addition to becoming Professional Engineers and undertaking technical careers, will also have aspiration of becoming leaders in business and in the community, managers, physicians, lawyers, bankers, researchers, scientists, politicians, economists, writers, architects and artists.

Evolution of our Undergraduate Programs

The quality of the undergraduate programs and of the students enrolled in our Faculty represent two of the highest priorities for our Faculty. Each Department has articulated the future directions and corresponding actions in the Departmental Plans collected in Appendix A. A brief summary is presented here:

Chemical and Biochemical Engineering

The Department of Chemical and Biochemical Engineering currently offers 5 undergraduate program options (General Chemical Engineering; Biochemical and Environmental Engineering; Chemical Engineering with Business; Chemical Engineering with Law; and Biochemical Engineering with Medicine). In collaboration with the Biochemistry Department of the Schulich School of Medicine and dentistry, a new option (Biochemical Engineering with Biochemistry) is proposed as part of this four-year plan. The Department is proposing to enhance the quality of the student learning experience via an improved student centered approach carried out through top quality lectures, laboratory experiments, design projects and case studies. They will focus on the creation of a mega undergraduate project on emerging and innovative topics relevant to the Department (water purification, fuel cells, solar energy, and beer brewing) as proposed in consultation with our undergraduate students. The mega project will provide students a first hand experience in Chemical Engineering. The Department will endeavour to promote and facilitate, through alumni and industry, summer co-op (SECOP) and industrial internship (IIP) opportunities to ensure relevant work experiences. Chemical and Biochemical Engineering will take advantage of hiring visiting professors and limited duties lecturers for strengthening teaching and helping to reduce the teaching loads of regular faculty members. Speakers from industry and academia will be invited to speak to the student body, to share their experiences and opportunities. In addition, the Department will encourage students in career related extra-curricular activities such as Engineers without Borders.

Civil and Environmental Engineering

The Department of Civil and Environmental Engineering currently offers a single Civil Engineering degree program with options in Structural Engineering (75% of students) and Environmental Engineering (20-23% of students). The remaining students select the concurrent degree programs Civil Engineering with Management, Civil Engineering with Law, Civil Engineering with Computer Science and Civil Engineering with Environmental Science. With the focus on Natural Disaster Mitigation and Management and critical linkages with the Institute of Catastrophic Loss Reduction (ICLR) and with the Boundary Layer Wind Tunnel (BLWT), the Department is considering the introduction of an option in this area. The groundwork was laid two years ago with the introduction of the 4th year elective course “Natural Disasters: Mitigation, Modeling and Assessment”, which is currently very popular among students with more than 50% of the 4th year students enrolled in it. The Department will build on this success and introduce more courses to improve the breadth of the program. One area that will be critically reviewed is the Environmental Option. A draft proposal has been prepared by the Department Long-Range Planning Committee to introduce new courses in drinking water treatment and supply and wastewater treatment in the environmental stream. A course in nanotechnology and applications to pollution remediation, Environmental Applications in Nanotechnology, will be introduced as a technical elective. A new option Civil Engineering (International Development) and a new double degree program Civil Engineering with Medicine have been approved to start in the 2007-2008 academic year. The motivation for the introduction of the International Development Option in the Department’s undergraduate program is the realization that, over the next 20 years, the population of the world will increase by almost 2 billion and 95% of these new citizens of the world will be living in developing countries. This growth will result in an unprecedented demand for energy, food, land, safe water, transportation, waste disposal, health care, environmental remediation, telecommunication and other infrastructure. The Department’s Civil Engineering International Development Option will fulfill this demand by introducing students to the complex societal, environmental, political and economic issues impacting engineering activities in the

developing world, and it will include courses from the Social Sciences, the Schulich School of Medicine and Dentistry, and Huron University College. A centerpiece of the program is the optional but highly recommended Summer Community Development Placement through which students will have an opportunity to work in a developing country for 4 months in a civil engineering context. The Department will continue to pursue strategic outreach programs to keep the undergraduate enrolment at the current levels, and the vision is to have 45 students in Structural Engineering, 15 students in the International Development Option, 10 students in Environmental Engineering, and 5 students in other Concurrent Degree Programs. Finally, the Department will continue to enhance the student experience with relevant real-life capstone design projects proposed by the City of London, by the Boundary Layer Wind Tunnel Laboratory, and, as recently agreed, by the University Physical Plant Department.

Electrical and Computer Engineering

The major aims of the Department of Electrical and Computer Engineering over the next four years will be in strengthening its existing Electrical Engineering (EE), Computer Engineering (CE), and Software Engineering (SE) programs. The Department has strived and will continue to strive to have high quality programs for high quality students. ECE Department expects to get about 30% of the total students entering year 2. At the current enrollment level of about 300 students in the first year of engineering, this would mean a total of about 90 students into the three programs. It is expected that the EE and CE programs will have the largest number (approximately 60 students combined), followed by the SE program (approximately 30 students). The Electrical Engineering (EE) program currently has two options, 'Wireless' and 'Power Systems Engineering'. Power Systems Engineering has been very successful and is already receiving very good reviews both internally and externally. Western is one of the very few universities that have a 'Power Systems' option. Every effort will be made to further strengthen this option by adding new laboratories such as a power electronics laboratory and also, creating scholarships and internship opportunities for students intending to take this option. The Department is actively looking at adding a 'Biomedical Engineering' option within the EE program. The Department is deeply concerned about the low enrollment in the Computer Engineering (CE) program. Major revisions in the curriculum are planned in consultation with the faculty and the outside CE engineering community. It is expected that CE curriculum will include aspects of software engineering. ECE Department will be exploring a number of options to bolster the CE program. These range from changes, such as having a 'Mechatronics' option within the CE program or a significant change such as merging the EE and CE programs to offer a degree in 'Electrical & Computer Engineering' and providing exciting options such as 'Wireless', 'Power Systems Engineering', 'Robotics & Automation (Mechatronics)' and 'International Development'. The Software engineering (SE) program is maturing, gaining reputation and its graduates have done very well. A major overhaul of the curriculum is planned. The SE Curriculum Committee has already been working and should be able to proceed with the proposal of the revised curriculum after the 2006 accreditation visit. This program currently has a concurrent degree with Business. However, to further the mission of high-quality enriched education, the possibility of having a concurrent degree with Faculty of Information and Media Studies will be explored. The Department will make aggressive efforts to increase the number of industry-sponsored capstone design projects. In recent years the Department has been successful in developing three new undergraduate laboratories with equipment donated by industrial sponsors: Texas Instruments Digital Signal Processing Lab, Schweitzer Engineering Power System Protection Lab, and the Cisco Lab.

Mechanical and Materials Engineering

The Department of Mechanical and Materials Engineering strongly supports the concept of enriched engineering education. The major aim of the Department over the next four years will be in modernizing the core program and methods of its delivery. The Mechanical Engineering program represents the most popular choice among first year students resulting in the enrollment of 80-100 students entering year 2. The Department intends to maintain this enrolment while focusing on the recruitment of the best students. The Department currently offers structured concurrent programs in Business, Law, Medicine, Computer Science, Applied Mathematics, Economics, French, Medical Biophysics and International and Comparative Studies,

and a Certificate in Technological Entrepreneurship. The Mechanical Engineering program is structured without formal options, in such a way that all students follow the same rigorous course in years 2 and 3 and have opportunity for specialization in year 4 in the form of seven electives to be taken out of 20+ available courses. The Department intends to maintain the same structure of the program while increasing the number of choices in year 4 as well as improving the method of delivery. New courses will be offered in areas of major technological changes. The Department plans to rationalize the use of information technology and standardize software used in different courses from year 1 through to year 4. It is planned to retain a strong component of fundamentals, while taking advantage of software tools in homework assignments, projects, tutorials and laboratory exercises. It is planned to implement compulsory computing devices of laptop type within a couple of years. The Department intends to strengthen the laboratory experience by modernizing equipment and upgrading data acquisition and analysis systems, in parallel with the general intensification of the use of information technology. It is planned to develop web-based instructions and videos to assist students in understanding the purpose of the experiments and how to conduct them. The Department proposes to introduce a concept of seamless undergraduate-graduate laboratories. The basic idea involves the use of graduate, research level laboratories to carry out undergraduate laboratory exercises. This will result in undergraduate students working in the real-life working laboratories contributing significantly to the improvement of their educational experience. In addition, this concept will reduce the need for additional research laboratory space as well as will optimize the use of research equipment. The Department plans to encourage students to participate in various group and individual projects as this significantly enhances their overall experience and promotes leadership skills. The Department has introduced a 4th year undergraduate thesis course as an additional technical elective. The Department offers at present four large-scale projects that are operated by students on voluntary basis. These include: the Sunstang Solar Car, the SAE Race Car, the Mini Baja and Flying Mustang. The Department plans to put more emphasis on these projects and bring to the attention of students potential to satisfy requirements of capstone design through participation in these teams. The Department plans to introduce an additional project that is at present referred to as the “Mars Rover Competition”. Overall, the Department operates typically about 30 projects per year, including 6-10 industry sponsored projects. The Department plans to increase the number of industry-sponsored projects so that every interested student has an opportunity to participate. New multi-disciplinary courses will be offered to expose students to new technological trends as well as to enrich their experience: Computational Fluid Dynamics, Nano-materials, Micro-Electro-Mechanical Systems (MEMS), Introduction to Nuclear Engineering, Flight Dynamics, and Internal Combustion Engines. The Department strongly feels the need to expand its areas of expertise in order to provide graduates with exposure to current technological trends relevant to the regional industry as well as contribute to the knowledge-based economy of Ontario. Four priority areas have been identified: Propulsion and energy efficient engines; Smart structures, self-assembling structures, and self-healing structures; Smart machines; and Flight dynamics. The issue of automotive engineering requires careful scrutiny. The automotive industry has a strong presence in the Southwestern Ontario and indeed it forms a backbone of the Ontario economy. The Department at present does not offer any specialized course in this area. The issue of whether the Department and the Faculty should get engaged in this area beyond what has been proposed above needs to be discussed. The Department considers two “signature” programs, i.e., Aviation Program (as an undergraduate concurrent degree or, preferably, as a graduate program) and a Space Technology Program. The Space Technology program will be operated in cooperation with the Department of Electrical and Computer Engineering and will be focused on teaching students space-related technologies.

Integrated Engineering

In addition to departmental based programs, the Faculty of Engineering has pioneered the creation of an Integrated Engineering program that received its first accreditation in 2001. This program was originally intended to provide a broad and more general interdisciplinary engineering education, addressing the needs of small industrial organizations and the needs of students interested in pursuing multidisciplinary fields of research. The program has been created with a strong design focus, and incorporates a variety of enrichments, to enhance the non-technical skills of creativity and innovation, leadership and teamwork,

communication, critical thinking and problem solving and the commitment to life-long learning. This program was created with the assumption that it required a minimum investment in “new” resources, since it was largely based on course offerings already existing as part of the other “disciplinary” programs. As a result, the aim of the program was to attract approximately 20 students per year. Unfortunately, during its initial implementation, the program only attracted anywhere between 8 to 12 students entering the year 2, and consideration has been given to either ending the program or redeveloping it into something more attractive to students. Recognizing that most emerging technologies are multidisciplinary (i.e. Nanotechnology and Micro-Electro-Mechanical Systems (MEMS); Mechatronics; and Bioengineering/Biomedical Engineering), Western Engineering has proposed, in addition to the fully broad-based program, the introduction of these three possible areas of focus, or specialized streams, associated with the Integrated Engineering (Emerging Technologies) Program. Students are attracted to these areas, in part due to marketing by competing universities. These streams give us the opportunity, however, to capture very bright students in areas that often lead to graduate education. Each stream consists of five technical electives chosen from a defined menu of courses. This strategy increased the student interest with 19 students registered into the second year of Integrated Engineering in 2006-7. In the future, Western Engineering will consider expanding the specialized streams to possibly include Project Management; Materials Engineering; Controls Engineering; and Environmental Engineering.

Teaching Assistantships

A large number of Teaching Assistants come from non-English speaking countries and as such, teaching assistants often experience communication and cultural problems. The Faculty will impose mandatory language testing for all graduate students who want to work as teaching assistants (CanTEST). This test will be replaced by the TOEFL test once TOEFL provides an option for testing TA communication abilities (expected to become available in 2007). In the case of students coming from non-English language countries, teaching assistantships will be offered only to those who have achieved a sufficient score on this test. The Faculty will also strongly encourage graduate students to take courses offered by the Teaching Support Centre in the area of Canadian Academic Culture (ITATP) and Communications in the Canadian Classroom. In addition, evaluation of TAs will become routine. This evaluation will be used to ensure high-quality TAs and determine TA training needs. However, a formal TA evaluation process should be developed with adequate availability of resources for this purpose.

Courses Delivered by Other Faculties and the First Year Program

Another critical area that requires special attention is the relationship with other Faculties that contribute math, science and complementary studies courses to the Engineering programs, particularly in the first year. It is essential to maintain a strong communication and ensure a tight quality control. The first year math courses will also require revisions in light of the anticipated changes in the math and calculus syllabus in the high school curriculum. Similarly, we need to continuously review and enhance the first year Design Course. Western’s leadership in the establishment of such course has inspired most of the other Engineering schools. However, although this course is highly praised for the extent of student engagement, it is particularly challenging and very resource-intensive. Therefore, continuous improvements and extensive efforts are necessary to ensure its success and sustainability in the future. The possibility of offering this Design Course also in the summer will be explored, aiming at facilitating the transfer of students from Science to Engineering.

Technical and Professional Communication

The Faculty continues to see a need for the enhancement of Technical and Professional Communications as part of both the undergraduate and graduate curriculum. In addition to providing basic skills in business writing as is required for accreditation purposes, we feel that upper year courses (possibly, joint graduate and undergraduate courses) are important in order to provide both graduates and undergraduates with skills necessary to become leaders in their careers. We promote Western Engineering to

prospective students as a course of study that will provide graduates with technical skills (as can be found at all accredited Engineering Schools) as well as additional critical thinking and leadership skills that will enable them to advance in their careers and secure senior positions in whatever field they choose. We continue to explore the best way of offering these skills to our students. Senior level courses could, for example, be coordinated by existing faculty members in Engineering inviting appropriate guests in to deliver guest lectures. Such skills, as preparation of research grant/funding proposals, peer-reviewed journal articles, expert consultant reports, conference presentations, poster development and so on, would be covered. Successful delivery of the senior level courses would require communications experts working together with professional engineers. While there have been discussions with the Faculty of Arts and Humanities, including the Dean and the Director of the Writing Program, a clear proposal for collaboration has not been identified. Right now, Engineering has staff from The Effective Writing Centre working as limited duties instructors for the core second year Communication course. It may also be feasible that some further partnership with this unit could be explored.

The Undergraduate Laboratories

The undergraduate laboratories of all Departments need to be continuously updated, modernized and provided with the best and most reliable educational equipment. During the last year alone, the faculty of Engineering invested over \$ 800,000 for major improvements of the undergraduate teaching labs infrastructure in all Departments. In the immediate future, the use of web-based instruction and videos will be implemented in association with some of the undergraduate laboratories to enhance the quality of the experience and support the efficiency of the Teaching Assistants. The Departments are also exploring the introduction of a laboratory component associated with some of the graduate courses, i.e. the use of some labs for both undergraduate as well as graduate instruction. The Faculty of Engineering has created an equipment reserve fund (current value is approximately \$ 1.7 million), which has been built up over the years, with the intent of providing a pool of resources to handle periodic equipment upgrades. However, this fund is insufficient to cover all the demands, and we need to continue to rely heavily on equipment donations and funds generated by fundraising. Significant discussions are ongoing among the Chairs to develop some common centralized laboratory facilities and increased efficiency in sharing the resources associated with courses that have large common components.

Western Engineering anticipates a much more extensive use of innovative teaching pedagogy and technologies in the upcoming years, including distance education, with the aim of improving the quality of the course offerings and of the laboratory experiences. The relevant IT issues are addressed elsewhere in this Plan.

Engineering Design Education

In addition to participating in first year and senior capstone design projects, many undergraduate students are involved in a number of extracurricular mega-projects that are conducted outside of the classroom, and all students participate in team-based design projects. The multidisciplinary mega-projects include the well renowned Formula SAE racecar, the Sunstang solar car, the Mini Baja off-road vehicle, the Flying Mustang cargo plane and the Concrete Toboggan. More recently, new projects have been introduced, such as the WE Bots, and the Beowolf SuperComputer, and new upcoming mega-projects have now been proposed (Mars Rover, Water Purification, Fuel Cell, Solar Energy System, Brewery..). Despite the huge needs, students currently only have access to very scarce financial resources and, in essentially every case, substandard space and limited tools and equipment, for the execution of these projects. In contrast, most of the other major Engineering Schools offer significantly better access to space and facilities for the development and execution of these projects and, because of their considerable visibility among prospective students, this current limitation at Western plays quite negatively on our recruitment efforts. The Faculty plans to encourage students to participate in various group and individual projects as these activities significantly enhance their overall student experience and promote leadership skills. Therefore, a partnership with the University Machine Services (UMS) is being developed which would see UMS expanding its role in

support of the undergraduate engineering programs. The opportunity to further develop synergies and better utilize the services and expertise within UMS will ultimately benefit the students and will enhance existing programs. The proposal suggests for a better use of The Peter C. Maurice Lab in the Thompson Engineering Building (TEB) and for the renovation of the lobby area of the TEB abandoned by Food Services. The first stage involved the reconfiguration of the lab space to accommodate equipment that would be available to students under close supervision of UMS staff; this phase is now partially complete with an additional piece of machinery to be added in future (e.g., CNC mill). The exposure to manufacturing tools and their integration into the design courses provides a safe and technologically sound enhancement of the students' experience. The second stage will entail the renovation of the space vacated by Food Services in the TEB lobby to accommodate student/client interactions with UMS. Visitors to TEB would be greeted by a vibrant display of student and UMS projects with the sophisticated technology of rapid prototype equipment as a backdrop. As UMS staff would share the area, we can expect a high level of activity. The purchase and maintenance of the equipment may be shared or the responsibility of UMS, and the asset value will be dedicated to Engineering for the financial benefit of both units.

In addition to space and equipment, many of the design projects require expert advice that goes well beyond the experience and capabilities of our faculty members and technical support staff. Over the years, we have been tremendously successful in building a network of professional engineers willing to volunteer their time to provide guidance and advice to our students. Western Engineering would like to expand on this external contributions by creating, in partnership with industry, an "engineer in residence" program, thus enabling us to host visiting professionals from the various disciplines for extended periods of time. Recently, for example, Western Engineering has been successful in securing the secondment of Bjarni Tryggvason, a well known Canadian astronaut who flew on a Space Shuttle mission in 1997, as a Visiting Professor for a period of three years, with the full sponsorship of the Canadian Space Agency. In addition, the Faculty of Engineering has been successful in building an endowment that will allow the Faculty to provide some resources to support nominal stipends for the "engineers-in-residence" and some of the costs of these enrichment programs.

Co-operative Education and Industrial Internship Program

The Faculty is currently operating a very successful Industrial Internship Program (IIP) and, more recently, a Summer Engineering Co-Op program (SECOP) has been added in 2004. In 2006, 92 students have been placed in IIP positions (thus representing roughly 1/3 of the overall eligible student population) and approximately 82 students have been placed in SECOP positions during the summer. Although we do not expect the IIP program to substantially increase, since students have many alternative choices, we believe that SECOP will continue to expand over the next 4 years, with a target of being able to offer a SECOP position to any student that wishes to make use of this type of work experience.

Concurrent Degree Programs

The ability to offer concurrent degree programs represents a tremendous area of strength of our Faculty. Currently, 142 students are taking advantage of this form of enrichment. The most popular programs are the Ivey HBA (36 students), Computer Science (29 students), Economics (15 students), Applied Math (9 students) and Medicine (8 students). Western Engineering will continue to expand these opportunities and we expect an increase in concurrent degrees with Arts & Humanities, Information and Media Studies, Health Sciences, Law and Social Science.

International Exchanges

Western Engineering supports The University of Western Ontario's strategic initiative to expand study-abroad opportunities for our students in conjunction the Faculty's aspirations for increased efforts in

internationalization. The Faculty of Engineering currently offers international exchange programs for undergraduate students who wish to spend up to a year at another university. However, professional accreditation requirements restrict the academic choices when studying abroad. Academic constraints and the high cost of attending an international institution have deterred many Western engineering students from participating in student-exchanges and study abroad programs. In the current academic year there are seventeen exchange students from foreign Universities enrolled in engineering programs, while only two Western students are abroad pursuing their undergraduate studies.

In the next five years, the Faculty of Engineering will work to significantly increase the number of students pursuing part of their program-of-study outside of Canada. This is in response to Faculty's desire to enhance the student experience through internationalization. To ensure accreditation of the programs the Faculty will need to identify a limited number of institutions with high professional standards that would be of interest to the students and negotiate a formal academic partnership that enables the program accreditation to be maintained. This may limit institutional choices for students on an exchange, but would provide the essential engineering education necessary for a Canadian professional engineering degree. Furthermore, efforts will be made to support current programs such as the student-led "Engineers without Borders" and the Faculty's new academic option in "Civil Engineering and International Development". Study-abroad and exchange opportunities that enhance these programs may be realized by working with one or more specific universities in developing countries. The immediate challenges would be to ensure professional standards as well as the safety and security of the students participating in the program.

Student Career Development

Western Engineering needs to expand the student career development services, ranging from a continuous expansion of the counseling activities and placements into SECOP and Internship positions, to the identification of permanent job opportunities for undergraduate and graduate students. These activities need to be well coordinated with the Student Development Centre (SDC), with the Faculty of Engineering looking after the personalized and disciplinary aspect of the counseling and job placements, and the central SDC operation taking responsibilities with respect to the general processes. Career development for graduate students is becoming a required added service for Western Engineering. This aspect includes opportunities for graduate students to develop skills to develop appropriate academic dossiers and to write effective grant proposals, to teach and supervise other students (summer students, Accelerated Masters, etc.), in addition to the identification of appropriate internships and permanent job opportunities.

Another aspect of strong interest to Western Engineering is to increase the number of international job placements for both undergraduate and graduate students.

The proposed added career development services require financial and human resources and the synergy with the Student Development Centre. Opportunity may exist to partner with SDC if a proposal for a shared staff position is approved. This professional staff member would be responsible for industrial/employer liaison, creating opportunities for co-op, internship and job placement at the undergraduate and also, possibly graduate levels

A further development that will facilitate student career placement is the establishment of the Southwestern Ontario Regional Office of the Professional Engineers of Ontario (PEO) in the Spencer Engineering Building, in close proximity to our Student Career Resource Centre. This office is due to open later in the Fall of 2006. It will provide students with access to the PEO, including information regarding licensure, job opportunities awards, networking and other functions valuable in job search activities.

Goals:

- 1) Stabilize the Undergraduate Enrolment Growth

- a. Evaluate existing and consider the creation of new or revised options, streams or programs in areas of competitive advantage
- b. Set realistic annual first-year targets
- c. Attract and enroll the best possible students and develop initiatives for recruitment and support of women and aboriginal students
- 2) Enrich the Quality of the Undergraduate Academic Experience
 - a. Ensure an ongoing curriculum review process and incorporate more opportunities for direct student engagement
 - b. Increase flexibility in the undergraduate curriculum to increase opportunities for students to have customized educational experiences, including cross-disciplinary enrichments
 - c. Engage undergraduate students in the Faculty's research activities
 - d. Ensure that all teaching assistant receive appropriate training and that, in accordance with provisions in negotiated Collective Agreements, their performance is annually assessed by students and professors
 - e. Attend to the quality and accessibility of the undergraduate lab equipment
- 3) Enhance the Marketability and Provide Career Development Opportunities
 - a. Continuous expansion of opportunities through Undergraduate Internships, co-op placement, and more post-graduate career placements including support in career counseling and job search strategies
 - b. Development of signature MEng programs to provide specialization learning opportunities, and enhanced research graduate initiatives such as expansion of Accelerated Masters and taking advantage of direct-entry Ph.D. programs
- 4) Continue to Enhance the Undergraduate Student Experience
 - a. Expand the Faculty's international exchange and study-abroad programs
 - b. Support and encourage broad experiences and student-directed extra- and co-curricular activities
 - c. Ensure that the undergraduate students continue to have a strong voice in the Faculty

4. Graduate Expansion and the Graduate Student Experience

Enrolment Targets

Western Engineering has already been the most successful Faculty at Western to build a significant expansion of its graduate programs. The number of graduate students has increased from just over 200 graduate students in 2000-01 to a total of 464 in 2006-07 (including the 20 Biomedical Engineering students supervised by Engineering faculty members), and further expansion is planned in accordance with the present Academic Plan. The development of the graduate program has taken place in parallel to the expansion in research intensiveness and to the decrease in teaching loads within the Faculty (from an average of four half-courses per faculty member to close to three). On the average, each faculty member now supervises 5.69 graduate students (including MEng, MSc and PhD), which, likely, represents the highest level across the entire University and close to the acceptable maximum that we could and should expect. This is particularly noteworthy when considering the large number of junior faculty members: we believe that increased seniority, reduced teaching loads, and increased faculty complement will continue to contribute to significant increases in graduate enrolment and in the ratio of

Student numbers represent a condition that is necessary but not sufficient. What is imperative is to ensure the best possible quality of students and programs

PhD:MESc students (currently at 1.59 and projected to further increase within the next 3 years). As the number of graduate students has increased considerably, the Faculty of Engineering has also been paying special attention to the quality of these students. All Departments have now committed to the exclusive hiring of “fundable” students and to various recruitment strategies to increase the number of awards holders.

The vision of Western Engineering with respect to graduate enrolment includes a significant further growth in both quality and quantity. We believe that, as a result of the shifting demographics and increased student interests, we should aim at maintaining an average ratio of research graduate students-to-FTE faculty member around 6. If the request for the faculty complement expansion articulated in this Plan is approved, Western Engineering could easily reach a total graduate student population in excess of 600 top quality students enrolled in highly rated OCGS accredited programs. In addition, we are setting the ambitious target of reaching a ratio of PhD-to-MESc approaching 1.7 to 2. The current graduate student numbers (Nov. 2006) and the long-term (Nov. 2009) departmental enrolment targets are:

Current	MESc	MESc	MEng	MEng	PhD	PhD
Nov-06	CDN	INT	CDN	INT	CDN	INT
CBE	14	11	1	2	25	25
CEE	24	14	12	0	35	42
ECE	31	27	17	4	43	22
MME	23	7	16	4	27	18
TOTAL	92	59	46	10	130	107
	MESc	MESc	MEng	MEng	PhD	PhD
Nov-07	CDN	INT	CDN	INT	CDN	INT
CBE	14	10	6	5	35	25
CEE	30	19	23	0	40	42
ECE	34	28	20	5	45	23
MME	26	9	27	3	31	21
TOTAL	104	66	76	13	151	111
	MESc	MESc	MEng	MEng	PhD	PhD
Nov-08	CDN	INT	CDN	INT	CDN	INT
CBE	14	12	8	3	38	25
CEE	35	20	25	2	42	45
ECE	34	28	22	5	48	26
MME	30	10	38	2	36	24
TOTAL	113	70	93	12	164	120
	MESc	MESc	MEng	MEng	PhD	PhD
Nov-09	CDN	INT	CDN	INT	CDN	INT
CBE	15	7	10	3	42	28
CEE	35	20	25	2	43	45
ECE	36	29	25	5	51	29
MME	32	10	40	3	39	25
TOTAL	118	66	100	13	175	127

These goals may appear ambitious, however, we have already demonstrated our ability to expand the graduate enrollment very rapidly (over the past 5 years), while substantially enhancing the quality of the students. As stated, the growth will result both from the hiring of new and previously approved faculty

positions and Canada Research Chairs, as well as from additional numbers of students supervised by the current faculty complement, especially as our probationary faculty members mature towards tenure.

Some Departments are developing incentives to foster these trends: for example, 10 TA hours are guaranteed for every PhD student and renewed subject to satisfactory performance, whereas only 5 hours are committed to MEdSc students. Similarly 10 TA hours are guaranteed to all NSERC scholars, subject to satisfactory performance.

Most of the graduate expansion has taken place as a result of an increase in the number of international students. Although this trend promotes increased internationalization, the government funding does not provide support for such students. Therefore, the Faculty of Engineering has decided to make further selective investments of central resources to increase the number of Canadian and Permanent Resident

On the average, each faculty member supervises now 5.69 graduate students. Likely, this represents the highest level across the entire University and close to the acceptable maximum that we could and should expect

students. Such incentive program consists of the selective 50% reduction of the tuition fees for Canadian and Permanent students for their first year in a Western Engineering graduate program and the increase of the Western Engineering scholarships available to faculty members to allocate to their graduate students by \$ 1,500 (from \$ 4,500 to \$ 6,000).

The qualitative and quantitative goals can only be achieved by developing and implementing a proactive recruitment plan, including a number of strategic partnerships with prestigious international institutions. Western Engineering needs to attract more scholarship holders, including NSERC PGS, NSERC IPS, OGS, OGSST and other scholarships (including international scholarships, such as the prestigious Mexican Conacyt scholarships). In addition, it is recognized that it would be beneficial to significantly increase the NSERC

Industrial Postgraduate Scholarship opportunities, thus providing our top graduate students with a valuable industrial internship experience during their graduate studies.

The different research groups within the Faculty that have reached a critical mass, international reputation, and research collaborations, will be actively involved in the recruitment efforts for top quality domestic and international students. Each group will work with the Faculty's Communications Officer to develop a communication strategy and promotional material consistent with the Faculty "brand" but promoting their unique research activities (website, newsletters, outreach activities); proactively recruit top quality students and scholars; invite visiting professors and organize seminar series. The groups will also communicate with collaborating groups across the country and worldwide to encourage potential graduate students to join them. This will undoubtedly help increase the number of award holders.

Masters of Engineering (MEng) Programs

In order to attract our own strong undergraduates into graduate studies, we need to take full advantage of the Accelerated Masters program and to introduce a number of selected "Signature" Full-Time M.Eng. programs, effectively adding an optional year of specialization to the traditional undergraduate programs. M.Eng. programs can also be very effective in addressing the significant need for education and integration of the many hundreds of internationally trained engineers immigrating to Canada every year. Provincial funding opportunities are explored to assist in providing M.Eng. programs and industrial placement opportunities specially tailored for internationally trained engineers to help integrate them in the Canadian job market and to address industry needs in certain high demand areas. These "signature" MEng programs do not necessarily have to be separately accredited by OCGS with specific names and designations, but they can be identified by

a generic name (i.e. Electrical Engineering) but provide several areas of focus in line with the specialties of each Department or Research Group.

The structure and types of graduate courses offered by each of the Departments will be reviewed and compiled into a yearly Faculty Catalog. Within the constraints of OGCS accreditation, the number of dual undergrad/graduate courses will be expanded providing a sufficient course availability to serve the needs of senior undergraduate students, M.Eng. students, as well as those of the research students (M.E.Sc. and Ph.D.). A number of new courses will be developed to strengthen existing and emerging research areas. Since certain new graduate courses will include a lab component, they will require the creation of laboratory capacity and acquisition of additional teaching equipment.

The Department of Chemical and Biochemical Engineering (CBE) plans to offer M.Eng. programs with focus areas in Environmental Engineering and in Chemical Engineering, and, in doing that, it will establish strategic partnerships with the other Departments and with the Sarnia-Lambton Research Park.

The Department of Civil and Environmental Engineering (CEE) is planning to introduce a M.Eng. degree program with focus in Natural Disaster Mitigation and Management, which will include strategic partnerships with the Schulich School of Medicine & Dentistry, Social Science, Health Sciences and with the Universities of Colombo and Moratuwa in Sri Lanka. Part of the offerings of this program will include e-learning and distance education. Also, a new MEng program in Engineering Sustainability and International Development is proposed. In addition, CEE is proposing a number of “Signature” MEng programs with focus on the areas of strength of the department (Geotechnical and Geoenvironmental Engineering; Wind Engineering and Environmental Fluid Mechanics; Structural Engineering and Infrastructure Renewal). These MEng programs require additional faculty resources for their implementation.

Starting from the current academic year, Electrical and Computer Engineering (ECE) has started offering MEng programs in Power Systems Engineering, Software Engineering, Communications and Networking, and Robotics and Mechatronics. A possible M.Eng. in Nanotechnology is also under consideration.

The Department of Mechanical and Materials Engineering (MME) has developed new M.Eng. programs in Advanced Fluid Mechanics, Materials and Solid Mechanics, Biomechanical Engineering, Automation Technologies and Systems, and Mechanical and Materials Engineering. The Department is preparing the introduction of an Aviation Program that permits students to obtain a professional flying license while studying full time towards their engineering degree. The program is geared towards very specialized market segments, i.e., people who want to fly but do not necessarily want to design planes. It is expected that this program may attract 20-30 dedicated students each year. It appears that the best option would be to structure the Aviation Program as a M.Eng. program as this would provide three semesters for completion of the course work as well as flight training, and would open the market for applicants from the whole country. The additional benefits would involve attracting high achieving Canadian students (as they would have to satisfy entry requirements for the Graduate School).

Masters of Engineering Science (MEngSc) and PhD programs

Each Department has restructured the Graduate Research Programs by focusing on the individual areas of strength. Research groups and centres are becoming more proactive in the recruitment of high caliber students through a variety of programs, including the Accelerated Masters Program, NSERC Undergraduate Research Scholarship Awards (USRA), and significant outreach activities.

The Graduate Research Program expansion that we have experienced has been tremendously successful and it is inspiring the junior faculty members as well as faculty members from other Faculties.

Enrichments, Support and Services

The need for highly desirable enhancements in the area of Technical and Professional Communication for graduate students have already been mentioned earlier in this document. Similarly to what has been already successfully implemented at the undergraduate level, Western Engineering wishes to provide also education opportunities to graduate students in the field of technological entrepreneurship.

One critical area of need is the appropriate office and research space for graduate students. Some of the Departments have reached their full capacity, while others are beyond. It is imperative to address these needs as soon as possible, considering the essential requirement to have graduate student office spaces close to their labs.

Some of the Departments have established special support for graduate students: for example, travel grants of \$500 and \$300 are provided by the Departments of Electrical and Computer Engineering and of Civil and Environmental Engineering, respectively, to any student presenting papers at a conference. In addition, awards are given to students that excel in their seminar presentations or in performing their TA duties.

One area that needs final resolution is the administrative structure of the Biomedical Engineering (BME) program. Western Engineering has proposed to the Faculty of Graduate Studies to transfer to the Faculties involved in the BME program the full funds generated by BME students (ECF, GSSTF and GEF) and, consequently, the full responsibilities for funding the students, the TAs and the secretarial support. It has been proposed that the transfer to the Faculties will be done proportionally to the students supervised by faculty members of the respective faculties. Currently, the BME program has a total 20 FTE MEd and PhD students, supervised by Engineering faculty members. In turn, the Faculty of Engineering will support the students at the yearly rates (identical to those used for Engineering students) through the Western Engineering Scholarship program. In addition, each student will receive a yearly average of over \$ 4,000 for Teaching Assistantships. The remaining funds will be used by the Faculty of Engineering to support (proportionally to the funding) the secretarial staff and the operating budget. It is quite alarming that the current enrolment of 20 students corresponds to a 27% decline from the 27 students supervised one year ago by Engineering faculty members. This is a clear indication that the program is not working at its full capacity in its present form, and possible alternative arrangements are being discussed with the Faculty of Graduate Studies.

Goals:

- 1) Further Increase our Graduate Student Enrolment according to the Plan and in relation to the resources available
 - a. Attract and enroll high quality students into our graduate programs
 - b. Significantly increase the proportion of Canadian and Permanent Resident students
 - c. Facilitate scholarship and admission applications for exceptional candidates
 - d. Ensure competitive levels of graduate student financial support
 - e. Ensure that space and facilities are appropriate for increased numbers of students
- 2) Improve Graduate Student Orientation
 - a. Offer rich cultural orientation programs for international graduate students
 - b. Offer rich academic orientation programs for all graduate students
 - c. Update and maintain the Graduate Student Information manuals

- 3) Enhance the Minimum Degree Requirements for Graduate Students
 - a. Examine adequacy of minimum course requirements
 - b. Enhance the structure of the comprehensive examinations
- 4) Improve Course Design and Scheduling Practices Across the Faculty
 - a. Through a variety of innovative mechanisms, increase the number and consistency of graduate course offerings and eliminate duplications
 - b. Ensure open access of graduate courses across the Faculty and University and facilitate interdisciplinarity
 - c. Move toward integrating research groups into graduate student and course management
 - d. Ensure teaching evaluations for all graduate courses
 - e. Establish metrics to evaluate supervisors' performance
- 5) Enrich Graduate Students' Academic Life
 - a. Offer seminar series in each Department
 - b. Increase the frequency of supervisory committee meetings
 - c. Encourage graduate students to attend conferences and present papers
- 6) Enhance the Marketability and Provide Opportunities for Students Graduating from Graduate Programs
 - a. Enhance professional development and career services for graduate students

5. Building the Research Intensive Faculty of Engineering

The research activities of Western Engineering have expanded considerably over the past 10 years. Today, the average research expenditures for faculty member have reached a record of \$ 240,000 per year. However, we are still lagging behind the most prestigious research-intensive institutions of North America particularly in the area of research contracts. As a result, we must further expand our research programs by:

- 1) achieving the critical mass in selected areas of study;
- 2) attracting better quality research graduate students and aim at recruiting more Canadians and Permanent Residents;
- 3) expanding our interactions with industry and government agencies;
- 4) attracting world class visiting scholars;
- 5) improving the overall quality, quantity, recognition and impact of the research;
- 6) offering expanded ranges of high quality graduate courses.

In order to achieve these ambitious goals, it is strongly recommended that cohesive research groups and centers that represent real partnerships within and outside the Faculty be established. The expectation is that these groups (and centers) would aggressively undertake focused research programs; pursue grants and industrial contracts applications; coordinate and rationalize space utilization and the use and management of facilities and resources; provide mentorship to new faculty members, including assistance in grant preparation and co-supervision of PhD students; attract renowned visiting professors and scholars; organize national and international workshops and conferences; and offer quality courses and MEng programs.

To validate the quality of our research and to generate essential resources for unconstrained, creative and visionary research, a critical aspect of the future success of the Faculty will be the ability to maximize the matching of industry funds with the corresponding peer-reviewed government programs

To validate the quality of the research and to generate essential resources for unconstrained, creative and visionary research, a critical aspect of the future success of the Faculty will be the ability to maximize the matching of industry funds with the corresponding peer-reviewed government programs (NSERC, ORF, CFI, OCE, etc.). Industry funding will continue to be

critically important, and, as described earlier, Western Engineering will establish clear and transparent incentives and reward programs for outstanding performance and success in the pursuit of sponsored research. One important aspect that we need to address is the benchmarking of the current research success, the establishments of specific goals and the continuous accountability to society, to the governments and to the industry sponsors of our research. There is a critical need to better communicate our expertise to potential users of our knowledge as well as to prospective students. The area of research communication requires special efforts and investments in order to reach an acceptable level of recognition.

In addition, we need to develop strategic plans for fundraising in support to our research infrastructure and activities, and for significantly enhancing the graduate scholarships, both in size and in numbers.

All Departments have identified their willingness to expand the collaborative opportunities within the University, with other Universities (nationally and internationally) and, in particular, with industry. The development of appropriate synergies in the development of research laboratories as well as research programs is critical to future success, to the expansion of our research activities, and to their broad recognition. This is a great area of opportunity that has tremendous potential for growth. The success in the implementation of vigorous research partnerships with other disciplines and with industry requires a considerable investment of time and energy in establishing effective linkages and providing academic colleagues and industry with clear information on our expertise as well as the variety of opportunities that exist for matching private sector resources with federal funds. The Faculty of Engineering anticipates a considerable increase in the number of partnerships and collaborative research and development programs across the disciplines and with the private sector, coupled with increased NSERC matching funds.

Areas of Research Strength

The following remarks highlight the key directions along which the research activities are being organized within the Faculty of Engineering. All Departments believe that the leap advancements and breakthroughs in research occur along the interfaces between different disciplines. This is recognized through the emergence of multi-disciplinary research groups within and across the Departments as well as other researchers on campus. Although the leadership of any particular group may be focused within a particular Department, most of the research groups include faculty members from across the Faculty of Engineering, and very often, involve close collaboration with colleagues from other disciplines across the University. These groups are based on demonstrated areas or themes of existing and emerging strength within the Faculty, and are important to determine appropriate allocation of resources aimed at further enhancing existing strength and growth in areas of strategic importance. Thus, establishment of functional research groups of sufficient critical mass will ensure the success of participating Faculty researchers in external funding opportunities of all types.

The Chemical and Biochemical Engineering Department has coordinated its research activities around strong research groups representing the main areas of strength: Bioengineering and Biomaterials; Green Processes and Products; Fluidization; and Particle Technology. The Research Parks (London and Sarnia) will offer a vehicle for enhanced interaction between these research groups and industry.

Research activities in the Department of Civil and Environmental Engineering have been streamlined to focus on three broad themes: Natural Disaster Mitigation and Management, Infrastructure Renewal, and Green and Emerging Technologies. Research under these themes will be pursued using available research

What are the top 5 areas of research for which we are internationally recognized?

strengths in Environmental Engineering, Geotechnical and Geoenvironmental Engineering, Structural and Infrastructure Engineering, Water Resources and Systems Modeling, and Wind Engineering and Environmental Fluid Dynamics, and through partnerships with world-class national and international institutions, including the Institute of Catastrophic Loss Reduction (ICLR), Trojan Technologies, and many other industry organizations. Recent successful infrastructure funding, such as the Three Little Pigs facility, offers exciting opportunities for cross-discipline collaboration between researchers within and outside the Department. An anticipated new nomination for a Canada Research Tier 2 position in Wind/Structural Engineering/Building Physics would strengthen expertise needed for natural disaster mitigation and management and infrastructure research and education. The nomination will also greatly enhance the building science facet of the Three Little Pigs project.

The Electrical and Computer Engineering Department has identified several areas of strength and growth. These include Information Engineering (including various aspects of Software Engineering, Communications and Computer Networks); Electrostatics and Electromagnetics; Power Systems and Power Electronics; Advanced Robotics and Real-Time Systems; Controls; and Biomedical Engineering (including Visualization and Human-Computer Interaction, Medical Imaging, and Robotic Applications in Surgery and Therapy); VLSI; Microelectronics; and Nanotechnology.

The Mechanical and Materials Engineering Department has coordinated the research expertise around four research groups corresponding to the key areas of strength: Advanced Fluid Mechanics; Materials and Solid Mechanics; Biomechanical Engineering; and Automation Technologies and Systems. In line with the above research groups' activities, the specific research programs under which graduate students are admitted are: Computational Fluid Mechanics; Experimental Fluid Mechanics; Biomechanical Engineering; Micromechanics; Nanomaterials; Materials; Mechatronic Systems; Solid Mechanics; and Geometric Computing.

Technology Transfer and Commercialization

Technology Transfer and Commercialization (TTC) is becoming an area of strategic importance that is necessary for modern Canada to compete in a knowledge-based economy. Western Engineering recognizes this and it will incorporate TTC in different aspects of its activities. The research collaboration with industry partners is a corner block in Western Engineering research plan. One of the main responsibilities of the Associate Dean (Research and External Relations) is to interface with the industry to identify industry needs through OCE network managers and officers and other links, and to match these needs with existing expertise within the Faculty. The research groups described above will help enhance this aspect, as they provide credibility for the existing research to attract the industrial support and ensure successful outcomes through ensuring sufficient resources in these areas. Increasing the number of NSERC-Industrial Postgraduate Scholarships (IPS) will further enhance this aspect, as the graduate students will serve as a vehicle for TTC and the exposure to the industrial work place will help focus their research activities to produce technologies of interest to the industry and, hence, enhance the potential for commercialization. To expand these opportunities, Western Engineering has partnered with Research Western by providing office space in Engineering for industry liaison officers to have a visible presence with the researchers. In addition, the Associate Dean (Research and External Relations), Department Chairs and the research groups will mentor junior faculty members and assist them in developing stronger links with industry. Incentives and reward programs established for outstanding performance and success in the pursuit of industrially sponsored research would help create an

We need to emphasize the importance of knowledge transfer, technology transfer, contract research, and commercialization of research discoveries, and track progress in all of these areas

environment that encourages TTC.

Well-established research groups and centers will also help create opportunities for commercialization. For example, the Boundary Layer Wind Tunnel Laboratory (BLWT) and the Geotechnical Research Centre (GRC) will continue to provide their unique expertise and engineering services to the industry. This is expected to develop with other emerging strong research groups and centres such as the Western Fluidization Group (WFG), the Particle Technology Group and the Software Engineering team. It is envisioned that the Faculty will continue to work closely with Research Western to develop partnerships with major industrial players in the City of London that is expected to increase TT and identify opportunities for commercialization.

The undergraduate design-based curriculum creates additional opportunities for technology transfer. For example, the Faculty will continue to seek industrial support for 4th year design projects in all Departments, which provides avenue for the industry to work with talented and skilled students in solving problems related to immediate industry needs. This aspect is also incorporated in thesis based courses in all Departments and in summer research internships. Furthermore, the entrepreneurship certificate program offered by Western Engineering introduces the students to the concepts of commercialization and provides them with the business tools and skills necessary for their success in this area.

Goals:

- 1) Increase Engineering Research Activity, Impact and Funding Levels
 - a. Set realistic funding targets
 - b. Develop indicators of activity and impact
 - c. Monitor and disseminate the results of the critical analysis of the indicators
 - d. Involve undergraduate students in research
 - e. Maximize government matching opportunities
 - f. Increase international research relationships and dissemination
- 2) Provide Services to Support Research Across the Faculty of Engineering
 - a. Establish proactive mechanisms of services and support
 - b. Ensure the availability of the appropriate facilities
- 3) Establish Faculty of Engineering Interdisciplinary Research Groups and Centres
 - a. Provide start-up and periodic support to group initiatives involving faculty members from across the Faculty and beyond
- 4) Encourage, Support, and Reward Research Excellence
 - a. Ensure sharing of space, resources and expertise
 - b. Encourage mentorship
 - c. Establish mechanisms of promotion and celebration of research successes
- 5) Encourage, Support and Reward Technology Transfer and Commercialization Initiatives
 - a. Emphasize the importance of knowledge transfer, technology transfer, contract research, and commercialization and track progress in all these areas

6. Internationalization

Internationalization activities are of significant importance to our Faculty. Western Engineering is developing a strategic internationalization plan for undergraduate and graduate student recruitment, for study abroad experiences and exchanges, and for international job placements (for both internships as well as

permanent jobs). Very significant opportunities exist in North Africa (Egypt), the Middle East (Kuwait, UAE, Qatar), the Far East (Korea, China and Japan), India, Mexico, Brazil, North Africa, and Europe. We expect to become more active in recruiting summer internship students from reputable universities in Mexico, India, and other selected countries; in inviting graduate students from Mexico with Conacyt scholarships through the efforts of the newly created Institute of Advanced Studies Canada-Mexico; and in expanding the recruiting efforts in Europe, Australia and Asia. Western Engineering intends to expand its initiatives dealing with international partnerships. A new double degree program is being piloted with the Politecnico of Milano (Italy). Once accepted, this arrangement will serve as a template for other selected double degree programs with other prestigious European Universities. Additional activities that will be strongly encouraged include the organization of international conferences and the participation in editorial boards of international scholarly journals.

Through undergraduate programs such as the new Civil and Environmental Engineering program in International Development, where there will be overseas work placements, students directly use their education and can see the impact of their profession on society, especially in developing areas of our country and internationally. The message of “Engineering as a Caring Profession” is being used to educate the public about the role of engineers and is anticipated to stimulate interest, especially in attracting more women, to the profession.

In addition to the benefits of international experience for students, the internationalization plan will address the importance of this diversification to the Western Engineering research program. Faculty members are encouraged to take Sabbatical Leaves outside of London and Canada. In return, we expect to become more active in inviting visiting professors and visiting researchers to Western Engineering. Students benefit by learning from world experts, Western Engineering benefits by “getting our name known” through research collaborations, with top engineers in their field. Incentives, such as the heavily University subsidized “Bed and Breakfast” accommodation at Western during summer months, and additional resources for teaching stipends, were appreciated and will need to be continued and expanded to support developing interest in these opportunities. While crafting categories of invitation that work within immigration regulations and Western policy and procedure (Collective Agreements) is time consuming and often complex from an administration perspective, the benefits to development internationalization of research through visiting appointments are clear. Faculty who are able to come to Western and have a positive experience from before their arrival date until after departure, are bound to enhance the image and reputation of the University, internationally. Western Engineering has already developed substantial experience and leadership in this area, and would be pleased to continue to work collaboratively, including in a leadership role, to share experiences with the University community, if this is desired.

Goals:

- 1) Enhance Western Engineering’s International Reputation as a Research Intensive Faculty of Engineering
 - b. Provide mechanisms and support to increase number of visiting professors and researchers to Western Engineering
 - c. Encourage and support faculty members’ international experiences, including Sabbatical Leaves, and participation at international conferences.
- 2) Provide Students with the Opportunity to Learn in Environments Welcoming Diversity from The Top Experts in their Fields
 - a. Increase the international content of undergraduate and graduate programs
 - b. Establish support systems to encourage visiting professors to teach graduate courses
 - c. Encourage development of international exchange and study-abroad opportunities at the graduate and undergraduate levels
 - d. Establish strategic initiatives encouraging enhanced interactions with targeted international institutions (i.e. double degree programs)

- e. Enhance our graduate and undergraduate programs to include international placements
- f. Apply the principle of “Engineering as a Caring Profession” to benefit society as part of educational and research experiences

7. Faculty Recruitment and Retention

Faculty Complement

As a result of the ambitious vision articulated in the 2002 Academic Plan, our challenge has been indeed formidable. However, faculty and staff have worked very enthusiastically towards achieving the goals that we had set for ourselves. The currently approved growth plan would allow the Faculty to increase its faculty complement by a minimum of 6 new FTE positions. In addition, with the specific objective of increasing the number of female faculty members, we have been proactively nominating top quality candidates for NSERC University Faculty Awards over and above the approved faculty positions. In the past four years, such efforts have resulted in the successful hiring of 4 NSERC UFA winners (although for family reasons, one has since left Western). One further nomination of very strong female candidate is being submitted this year.

Over the next 4 years, if the new faculty positions requested as part of this Plan and discussed below are approved, we will be reaching our “minimum level of critical mass” for a vibrant research-intensive Faculty of Engineering, offering the very best student experience of:

- A minimum of 100 excellent faculty members
- A minimum of 600 high quality graduate students
- A minimum of 1200 high quality undergraduate students

These goals are progressively being reached as the approved faculty appointments are secured. At the end of the expansion planned as part of the past Academic Plan, Western Engineering will finally be able to claim to have reached a minimum level of critical mass.

During the 2004 review of Western Engineering associated with the decanal appointment process, the external reviewers very positively acknowledged the tremendous and successful growth of the Faculty and the increase in overall quality and impact. Among their recommendations, however, the clear need to provide the necessary resources and environment to ensure the full development of the potential of the newly hired faculty and staff was highlighted. We support this strategy and we wish to seek the University support to achieve this goal while embarking into further expansion as part of this next planning cycle, beyond the positions already approved during the past one. It is important to recognize that the physical infrastructure has already reached, once again, its full capacity, and that it has become the limiting factor for further growth especially at the graduate student level. It is our firm belief that the first priority should be the consolidation of our operation and the creation of the best possible environment to support the current and projected faculty and staff in the development of their full potential, ambitions and aspirations. This is particularly important in light of the incredible success of the past 5 years in the creation of a large number of faculty positions partially supported

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by external contributions of limited duration, such as NSERC, ORDCF, private sector gifts and donations from various Foundations (Salamander Foundation and Whitaker Foundation). Therefore, it is imperative to ensure that an adequate budget and infrastructure can provide sustainable support to the ambitious path that we have set for ourselves and, particularly, to the enormous growth in faculty complement and graduate students that we have already experienced.

The Western Engineering vision includes a student-centered education, with a corresponding significant improvement in the student rating of teaching and in the overall student satisfaction. Over the past years, as a result of the previous Academic Planning, we have been successful in establishing very creative new faculty positions in areas of critical importance to the Faculty (design, multidisciplinary education, emerging technologies, etc.). Among these positions, we have created some expert and dedicated teaching-only faculty appointments to address the issue of the excessively high teaching loads experienced by our research-intensive faculty members. These new positions are addressing both the desires to achieve greater research intensiveness, as well as to enhance the overall quality of the teaching. The feedback of the students has been overwhelming positive and these professors are receiving among the highest teaching evaluations in the Faculty. Our strong recommendation is to continue to think strategically on how best to address the different teaching and research ambitions and talents of Western Engineering's faculty, and to provide people with the opportunity to develop their full potential. For example, current emerging strategies aim at attracting faculty members with significant and unique industry experience as well as at creating visiting appointments by attracting distinguished scholars both nationally and internationally.

After having reached the desired consolidation discussed earlier, the present Academic Plan articulates our desire to seek a minimum of 8 new FTE faculty appointments over the next 4 years, to build upon 11 areas of strength and strategic relevance, which will offer new enrichment opportunities as discussed in the previous sections, and summarized as follows:

- 1) Emerging Biotechnology, Green/Genetic Engineering, Biomaterials, Bionanotechnology (0.5 position shared with Biochemistry)
- 2) Conventional and Alternative Energy and Green Engineering
- 3) Pharmaceutical and Biopharmaceutical Engineering
- 4) Water Resources and International Development
- 5) Natural Disasters Mitigation and Management
- 6) Advanced Robotic Surgery (possibly 0.5 position shared with Surgery, Schulich School of Medicine&Dentistry)
- 7) Electricity Markets and Distribution
- 8) Propulsion and Energy Efficient Engines
- 9) Smart Structures, Self-Assembling Structures and Self-Healing Structures
- 10) Smart Machines
- 11) Flight Dynamics

We are seeking a minimum of 8 new faculty positions over the next 4 years to build upon 11 possible areas of strength and strategic relevance

In addition, we will proactively seek excellent candidates to be nominated for the NSERC University Faculty Awards in the areas of strength listed above, and, if successful, we will create additional positions. Similarly, we will continue to proactively explore the opportunities to create Industrial Research Chairs and other Externally Funded Positions in the areas of research strength of the Faculty.

The desired creation of an Aviation MEng Program in MME would require two additional faculty positions.

As part of this plan, we seek approval of all these positions, and the flexibility of hiring over the next four years based on the excellence of the applicant, the availability of the necessary resources, opportunities or constraints created by spousal job arrangements, and the ability of the research group and Department to accommodate the new recruit with adequate facilities and proper support and mentorship.

Although we have developed a very effective faculty recruitment strategy, and we are attracting the interest of good/excellent candidates for our vacant positions, it is imperative to ensure the availability of adequate financial resources and of a competitive compensation mechanism. It is absolutely essential to maintain competitiveness with respect to the other Engineering schools, particularly since the Universities in Western Canada and some Ontario Universities are embarking in major expansions. Collective Agreement negotiations should help rectify the situation at least in part. Even so, it is anticipated, that the Faculty of Engineering would greatly benefit by having at its disposal the financial resources to review all the salaries of faculty members and, when necessary, to bring them to the appropriate level of competitiveness with respect to the comparable schools.

On the positive side, one of the major changes that have favourably influenced our ability to recruit is the transparency of mechanism for providing central support to faculty members for their graduate students. The establishment of a clear formula funding by the Faculty of Graduate Studies, coupled with the new considerable resources that have been made available by the University and our prudent management of the Enrolment Contingent Fund (ECF), has enabled our Faculty to create a very attractive Western Engineering Scholarship program. According to this program, faculty members are guaranteed annual graduate student funding of \$ 6,000 for each fundable domestic student (recently increased from \$ 4,500), \$ 8,500 for each OGS/ST scholarship winner, \$ 10,500 for each fundable international student and each NSERC scholar. The start-up support package for new recruits includes the increase of \$ 6,000 per year over the above amounts, for a period of two years, for up to two students. The Western Engineering Scholarships can only be used to support the salaries of fundable students. In addition, new faculty members are offered a \$ 20,000 start-up package, including the \$6,000 promised to probationary faculty members in their Collective Agreement.

The Faculty of Engineering has initiated the award of one-time special salary stipends “recognizing exceptional performance in Teaching or Research”, as stipulated in the Collective Agreement (Compensation and Benefits, Section 40.1). We believe that, in view of the relatively low competitiveness of our salaries, such policy will provide an incentive and appropriate reward and recognition to faculty that perform at an exceptional level.

Spousal employment issues have often contributed to the failure in securing the hiring of the top selected candidates for faculty positions, and they have contributed to the recent resignations of at least two faculty members. In addition, we have been unable to assist other Faculties, or to be assisted by other Faculties, in the recruitment processes by addressing spousal recruitment issues across disciplines. On the other hand, Western Engineering has been very proactive and strategic and, within the limited resources at our disposal, we have been successful in securing the recruitment of female faculty members by dealing internally and through fair competition with the spousal recruitment issues. This has happened four times in very recent years, thus providing the indirect benefit of the successful recruitment of four outstanding female faculty members. Discussion needs to take place with respect to somehow taking advantage of this successful strategy in our future recruitment processes.

Goals:

- 1) Increase the Faculty Complement
 - a. Accelerate hiring efforts
 - b. Undertake proactive initiatives to attract the best faculty applicants

- c. Ensure that the hiring process is sensitive to all under-represented groups
- d. Set clear roles and expectations
- 2) Orient and Mentor Faculty Members to Ensure Continuing Excellence
 - a. Link new faculty with appropriate research groups and centres
 - b. Ensure the availability of collaboration and space before the hiring is approved
 - c. Assist faculty members to secure appropriate initial resources for their research
- 3) Support, Encourage, and Recognize the Success of Faculty Members
 - a. Facilitate the recognition of faculty members through nominations for prestigious awards and honors
 - b. Facilitate faculty members participation in enrichment opportunities and programs
 - c. Develop selective mechanisms of reward, such as through one-time stipends, in support of excellence in research and in mentorship
 - d. Offer strategies to provide faculty members with resources to succeed in areas of academic endeavour (e.g., strong start-up funding, identification of research facilities prior to appointment start, Western Engineering Scholarships, teaching workload of 3.0 half courses for those faculty with strong research and graduate students portfolio, alternative workloads for first year of appointment to establish research)

8. Commitments to Staff and a Supportive Workplace

Western Engineering's staff have experienced tremendous change to their work and work environment over the past 6 years, and they have contributed significantly to the successful growth and development of the Faculty. Staff numbers have increased, but not at the rate of graduate student or faculty expansion. At the same time, services expected of staff have expanded considerably, enabling faculty to dedicate their efforts to their areas of academic responsibility and students to dedicate their time towards their enhanced learning experiences. The Western Engineering Plus initiative and recruitment of academically stronger students require enhanced administrative support. Increased internationalization efforts have created new demands for staff to balance University policy and procedure with federal and provincial immigration and employment regulations. Technical staff actively contribute to the development of the undergraduate and graduate laboratory curriculum and management, under faculty leadership. Likewise, technical staff play leadership roles facilitating student co-curricular activities, such as in the multitude of mega-projects. Graduate programs have more than doubled in size. Departments now manage their own space assignments. Collective Agreements have added a new dimension to human resource management. The Faculty is no longer a small family. It has expanded to the point where buildings have been added and administrative services, such as graduate program administration, have been decentralized. Unique subcultures have evolved in the Departments, and a challenge has been to retain the connectivity with the guiding and evolving Faculty vision, so Western Engineering can move forward *en masse*.

Staff have been recognized for their contributions. Faculty awards for staff have been enhanced to be more competitive and meaningful recognition of the best. Monetary awards are on par with the Faculty awards. Even so, an alarming number of staff continue to feel their work is under-appreciated and under-valued. This needs to be addressed with input of the staff, in the next four years. The decanal review of 2004 suggested greater attention needed to be paid to internal communications, so that faculty, staff and students retain the Western Engineering identity and vision. To that end a Communications Officer has been hired and has made great strides in this regard. Staff have been encouraged to play active leadership roles in Western Engineering administration. The Director of Administration and the Director of Financial Services serve on Dean's Council and are voting members of Faculty Council. In addition, staff elect one administrative and one technical representative to serve as voting members on Faculty Council. Regular administrator meetings facilitate exchange of information between Departments and Dean's Office units. A staff management team has been created to address in a confidential forum issues affecting Western Engineering operations, and

strategies to facilitate effective administrative services. This team meets monthly, and includes University Machine Services (UMS) (Manager, UMS) and Boundary Layer Wind Tunnel (BLWT) (Director, Operations) management, in addition to the two aforementioned Directors, the Associate Director Information Technology Group, Manager Undergraduate Services, Manager External Services and Manager, Facilities. Quarterly staff meetings are well attended and serve as a further vehicle for information dissemination and exchange.

As part of the Academic Planning exercise, the Director of Administration offered an invitation to meet individually with all staff members. These sessions provided an opportunity to collect feedback on the proposed Academic Plan as well as to discuss ambitions, desires and concerns with respect to staff careers. There were 42 meetings through the winter and spring of 2006. The feedback allowed the Director to prepare a report for Dean's Council, also shared with all staff, with the goal of identifying trends to improve the workplace, and hence job satisfaction, for Western Engineering staff.

In summary, staff encourage initiatives to enhance the professional image of Western Engineering, including facility upgrades. With rare exception, staff found their roles interesting and challenging. The most satisfied staff were those who could see a direct connection between their jobs and the academic mission, particularly in terms of student support. A key initiative in the future will be to ensure all staff see the importance of their role to the Faculty and University. This connection will be clearly outlined in all staff job descriptions. Likewise, it is essential for staff to stay connected with the Faculty of Engineering, regardless of their home units. Internal communications remain critical and need to continue to be developed. Informal activities to allow casual conversation with colleagues from other units is strongly encouraged, as are opportunities for staff to participate on teams/committees with membership from across the Faculty.

With the expansion of Western Engineering and the demands on faculty members for enhanced research productivity and support of student engagement activities, as mentioned previously, and with increasing attention in relation to legislated processes (e.g., FIPPA, Occupational Health and Safety) staff have stepped to the plate in leadership capacity. As well, though, anecdotally we are told, and logic supports, that volume of work for staff has reached peak levels. Business processes and organizational structures are therefore being re-evaluated and opportunities to streamline are being identified and implemented. Staff have been seeking educational opportunities to enhance their skills, and such activities will continue to be supported and encouraged in future.

A key initiative in the future will be to ensure that all staff see the importance of their role to the Faculty and the University

Over the past 4 years, with the decentralization of the graduate program, each Department gained one support staff for this administration. As mentioned earlier, a Communications Officer has been hired (jointly funded with Communications and Public Affairs). With the expansion of infrastructure and with increasing attention to Occupational Health & Safety legislation, a 0.5 fte Facilities Manager has been hired. An additional staff member will be added (Fall 2006) to help the Information Technology Group cope with the heightened demands placed on them due to a retirement in Financial Services. With the establishment of an Office of External Services, a Coordinator of Student Career Services was hired to oversee summer co-op placements (SECOP) and industry internship (IIP) opportunities as well as to facilitate career counseling. A new position has been assigned to this same unit, that has yet to be filled, expected to support primarily the interdisciplinary graduate student initiatives and graduate career services. A Laboratory Manager was hired to two Departments (Electrical and Computer Engineering as a new position, and a reclassification/reorganization of technical support to the Department of Mechanical and Materials Engineering), and a technician hired in Civil and Environmental Engineering. A junior Academic Counselor was added to the Office of Undergraduate Services, to assist with core course administration as well as providing support and counseling for the Integrated Engineering undergraduate program. A Coordinator of

Faculty and Staff Relations was hired to facilitate the human resources administration of the Faculty. In addition, the Faculty assumed responsibility for 0.5 fte of the Alumni Relations and Development Officer position, and will seek to develop a role description that incorporates both the priorities of the Faculty as well as the Alumni Relations and Development Office.

To best support the Academic Plan, minimum anticipated staff hiring needs include (exclusive of BLWTL and UMS):

- additional laboratory support (between 2.0 to 4.0 fte depending on the expansion of the M.Eng program), especially for graduate courses with laboratory components and to manage shared equipment resources
- support for Information Technology (2.0 fte) as Departments enhance their teaching through electronic means
- additional support (0.5 fte) to create a fulltime Facilities and Safety Manager
- proposal for additional support (0.5 fte Engineering and 0.5 fte Career Services @ Western to create a position that will be based in External Services identifying opportunities for student co-op and job placements with employers
- administrative support (up to 2.0 fte) in new and emerging areas of priority (such as internationalization)
- contract/student support to help with the on-going development of the Academic Biography initiative

Improved communication strategies and better marketing of our Western Engineering programs and expertise, both internally and externally, including the branding of the Western Engineering Plus concept, remain high priorities and require significant deployment of financial and human resources. A successful implementation of these strategies will provide enormous benefits and facilitate the building of a stronger “*esprit de corps*” in our Faculty. Similarly, it has become more important than ever to strengthen the relationships with our alumni, friends and supporters, since their contributions (financial and in-kind) will continue to be absolutely critical to the future growth and recognition of Western Engineering. Special efforts will need to be concentrated on improving our outreach within the local industrial community as well as recruiting within the London area and Southwestern Ontario Secondary Schools using a variety of effective strategies, including documentation, events and competitions. A particularly fertile area is offered by the design mega-projects. A support system that permits sending of student teams together with student-designed projects for presentations in the high schools is being prepared. A system for expanding the already successful high school co-op program to include students working as part of mega-project teams is also being investigated.

In addition, it is essential to maintain high quality and continuously updated Web Sites carrying a consistent image. In addition, the publication of reports highlighting the major achievements in research and teaching would be highly desirable for possible distribution to Canadian industry and government organizations.

The publication of a yearly professional Research Report, summarizing the strengths of the Research Groups previously identified, is also required. This has been identified by Advisory Committee (ACWE) members as a priority request, in order to assist industry and University in the development of more effective and substantial partnerships.

Goals:

- 1) Establish an Appropriate Staff Complement
 - a. Commit to hiring staff of the highest quality for every position
- 2) Orient Staff Members to Western Engineering to Ensure Collective Understanding of Vision and to Develop Best Practices to Provide Support to Vision

- a. Develop ongoing communications strategies to ensure Engineering community is kept informed and given opportunity to provide input into means to make the vision of the Faculty a reality
- b. Continuously review administrative practices and organizational structures to ensure optimal support for Faculty initiatives
- c. Ensure job descriptions capture the added value of position to the organization
- 3) Create an Environment Conducive to Staff Satisfaction and Success
 - a. Recognize and reward staff excellence, both at the Faculty and University level
 - b. Attend to the job training and professional development needs of staff
 - c. Implement strategies to create a professional image of Western Engineering
 - d. Encourage development of means to reward exceptional performance of staff through selective salary adjustments, time off or other such initiatives
 - e. Offer Faculty-wide informal events to enhance the casual conversations between staff and faculty across the organization
- 4) Review and Update Faculty Communications Initiatives to Address both Internal and External Communications Needs Enhancing Visibility and Understanding of Faculty Priorities
 - a. Identify sufficient funding to allow development of high quality promotional and information materials, reflecting the professional Western Engineering and its priorities
 - b. Build Successful partnerships between management and Employee Groups and Develop a Communications Strategy with Faculty leadership (Dean’s Council) that is supported and bought into by the Faculty to ensure consistent messaging and imaging of Faculty
 - c. Develop measures of success of various communications initiatives

9. Women in Engineering

Engineering is a male dominated profession. Making the discipline more inviting to women has been, and will continue to be, a priority for Western Engineering. This involves improving the image, and educating the public, of the profession itself, in addition to creating a workplace and incentives that encourage recruitment of women.

The audience for outreach efforts has expanded to include girls as young as 11 and 12 (grade 7). Under the leadership of Dr. Cynthia Dunning and this year, Lesley Munteer, Manager of External Services, Western Engineering is host to an extremely popular event called “Go Eng Girl”. This is a province-wide initiative coordinated through the Ontario Network of Women in Engineering (ONWIE) for girls in grade 7 through 10 and their parents. They are introduced to engineering and participate in hands-on engineering activities. The event is extremely popular, to the point where enrolment had to be capped. To better integrate new incoming female Engineering students, a very effective mentoship program has been established. This program, named “Big Sister-Little Sister” pairs new female students with more senior ones.

Our Faculty communications, including faculty recruitment postings, emphasize Engineering as a “Caring Profession”. Women tend to favour careers where there are direct benefits to society and individuals in society. By educating the public to realize that many engineering applications directly relate to the more traditionally recognized “caring” professions, such as biomedical and biomechanical applications (such as prosthetic joint development), robotics (robotic surgery), international development (such as water treatment), environmental engineering (such as green processes), this will translate into heightened interest in Engineering as a career option. In addition, we feel Western Engineering Plus will give us a competitive edge over other Universities: students can get a

Women tend to favor careers where there are direct benefits to society and individuals in society

degree in engineering and medicine; Engineers Without Borders has seen tremendous success at Western since its inception two years ago and to the point of being recognized one of the most active student Chapters in Canada. The introduction of an option in Civil Engineering in International Development will likely attract even more outstanding female students.

The Faculty understands that all students need to decide at an early age whether they are interested in pursuing a career in science or engineering. Western Engineering wants to educate parents, teachers and students in order that they may make an informed decision. We also want to educate high school guidance counselors who have steered students away from the more challenging math courses due to the potential impact of lowering graduating averages and eligibility to be admitted to the University of choice.

Our initiatives have begun at a local level. With increasing resources, we would like to expand outreach efforts across Southwestern Ontario and into the greater Toronto area. The measure of success of our outreach activities, specifically those targeting the younger girls, will not be visible for 3 to 6 years down the road when they will apply to university.

Over the past few years, five Western Engineering nominees have been awarded the prestigious NSERC University Faculty Awards (UFA)

In terms of attracting female faculty, Western Engineering plans to continue to take advantage of programs such as NSERC-University Faculty Awards (UFA). Five women have received NSERC-UFA awards at Western Engineering, and further nominations are being developed. In addition, spousal employment is another issue affecting female recruitment. This has been addressed in detail in the Faculty Recruitment and

Retention section. As mentioned above, we are developing areas of research strength that support the theme of “Engineering as a Caring Profession”. We wish to create a more supportive work environment for women, recognizing the balance of work and family as being a critical factor in the recruitment of female junior faculty. This can be as simple as scheduling most meetings and classes between the hours of 9:00 and 4:00. Enhancing the professional image of the Faculty will likely appeal to all prospective faculty appointees, including women.

Goals:

- 1) Enhance the Role and Function of the Women in Engineering Committee
 - a. Establish the appropriate structure for this organization
- 2) Promote Western Engineering to prospective Women Students and Faculty
 - a. Enhance recruitment strategies
 - b. Consider the needs and interests of prospective women faculty in recruitment efforts
- 3) Contribute to efforts to promote Engineering to K-12 Girls
 - a. Establish appropriate initiatives based at Western and in collaboration with other peer institutions
- 4) Recognize and Reward Excellence among Women Faculty, Students, and Alumnae
 - a. Facilitate participation in scholarship competitions and conferences for women students
 - b. Facilitate participation in award competitions and conferences for women faculty members
- 5) Celebrate the Success of Western Engineering Alumnae

10. Alumni Engagement and Institutional Advancement

Western Engineering has identified some specific priorities for the current Interim Campaign (Campaign Western – Phase II 2005-2007), within the limited allowed budget of \$ 10.5 M. This total excludes the major fundraising priority represented by the Green Building Annex, described later in this document.

The current list of projects, developed prior to the discussion of the present Academic Plan, includes a number of projects that need to be revisited in light of the current discussions:

- 1) OGS/ST Matching funds \$ 1 M
- 2) Design Chair Endowment Top Up \$ 0.5 M
- 3) Engineers-in-Residence Program Endowment \$ 1.5 M
- 4) CFI Matching \$ 2 M
- 5) Centre for Nanotechnology and Nanoengineering (CNET) \$ 1 M
- 6) Innovative Delivery of Engineering Education \$ 3 M
- 7) Leadership and Innovation Undergraduate and Graduate Scholarships (Endowment) \$ 1 M
- 8) NSERC Industrial Chair in Collaborative Intelligent Manufacturing \$ 0.5 M

The creation of a Development Officer for the Faculty of Engineering has provided more effective means of reaching the Alumni and the community for friend-raising and fund-raising. Since our Faculty has recently assumed half of the funding responsibility for the Development Officer's position, Western Engineering will have the flexibility to direct half of this position. We envision this position to work more closely with the Coordinator of Graduate Studies and Research, especially with reference to industrial connections and networking. We would like the Development Officer to actively work on major donation projects for the Faculty and, at the same time, to more actively develop alumni connections, including garnering non-monetary support, such as the development of an alumni mentorship program for undergraduate students. Special efforts will be devoted to creating and enhancing a "students engagement" fund.

As part of our desire and commitment to enhancing the student experience, we intend to create a web site tentatively called "Western Engineering Mentors Club" where Alumni could voluntarily register (after a general solicitation and invitation is sent to them by the Alumni and Development Office) to become "mentors". In this process, they would identify keywords that designate their areas of expertise or interaction that they wish to have. The site could become the forum for matching undergrads/grads with committed alumni that wish to help and mentor them. As part of the program, we plan to establish a component called "Hire a Student/Hire a Graduate", where we would create incentives (and rewards) for Alumni to assist in the creation of jobs, either summer co-op and internships for both undergraduate and graduate students, and permanent employments for both. In addition, we have been discussing the organization of engineering "speed networking" evenings for our students with interested alumni.

Goals:

- 1) Enhance External Relations Efforts Across the Faculty
 - a. Ensure the participation of faculty and staff in appropriately representing the faculty in external relations, outreach, stewardship and recognition
- 2) Increase Total Philanthropic Funding to the Faculty
 - a. Set clear and realistic targets
 - b. Establish fundraising priorities closely linked to the needs identified in the Academic Plan

- c. Institute a Faculty-centered stewardship program
 - d. Prepare for the next major institutional fundraising campaign (2007-2013)
 - e. Increase the level of endowed funds
 - f. Create a “Student Activity” endowment fund
- 3) Improve the Engineering Alumni Programs
- a. Review existing programs, enhance them and establish new ones
 - b. Establish and communicate the availability of suitable professional development programs that benefit our Alumni
 - c. Engage Alumni with our students
- 4) Enhance the Visibility of our Faculty
- a. Establish a recognizable profile of our Faculty and a consistent image
 - b. Improve the web presence of the Faculty and all its units
 - c. Ensure a professional suite of print publications

11. Governance and Organizational Structure

As discussed in section 8, Commitments to Staff and a Supportive Workplace, using any number of measures (facilities/buildings, full-time faculty and staff complement, graduate student population, as examples), Western Engineering has developed from being a small Faculty at The University of Western Ontario to being a much more significant player. Along the way, there have been some modifications of governance structures (revision of Faculty Council Constitution, Department Council Terms of Reference and Dean’s Council membership). In addition, Departments have been given more control of their operations, such as space assignment, TA assignment and budget management for operations (excluding salaries and benefits of fulltime staff and faculty). Department Chair roles have expanded and the Faculty introduced remunerated (small stipend) Associate Chair positions. Associate Chairs typically look after either the graduate or the undergraduate programs of the Departments.

Given the number of innovative initiatives introduced by Western Engineering, and with the increasing size of the Faculty, administrative operations need to be continuously reviewed to ensure appropriate levels (both numbers and classifications) of support are in place to effectively manage operations. While this has not been the tradition at the Faculty of Engineering, staff will need to be relied on to use their expertise in management, human resources, finance, general administration, and technical expertise in IT, and engineering, to play more active leadership roles in partnership with faculty members. Business processes will be reviewed with a view to adopting best practices that fall within Faculty, University and, as appropriate, legislated policies and procedures. This will allow Department Chairs, Associate Deans and other members of Dean’s Council to dedicate more energy towards strategic development, rather than day-to-day administrative troubleshooting.

Goals:

- 1) Review Current Structure and Implement Appropriate Changes to Governance and Organizational Structure Necessitated by the Academic Plan Implementation
- 2) Work to Ensure that the Organizational Structures Support the Effective Leadership, Administration, and Operation of the Faculty
 - a. Empowering the Department Chairs, as leaders, to assume responsibility, accountability, and decision-making for their Departments
 - b. Review levels of Departmental empowerment

- c. Roles and reporting structures should be reviewed and clarified
- d. To create operational efficiencies, working with the Director of Administration and the Director of Financial Services, each Associate Dean and Department Chair will work to identify and disseminate best practices across Departments and to facilitate resources and information sharing among Departments and with the University

12. Our Physical Infrastructure

The issue of shortage of space has been addressed already many times. The amount and quality of the space available to the Faculty has substantially increased with the construction of the Thompson Engineering Building, the Classroom Annex, and the 60-seat graduate student office addition located next to the Boundary Wind Tunnel Building.

However, as a result of our growth, space is, once again, very critical and it is becoming the limiting factor influencing our future growth, the student and faculty recruitment, and the teaching and research successes. We anticipate that our research intensiveness will be seriously compromised in the immediate future as a result of space limitations for the research laboratories, for graduate students and for faculty and staff offices. For example, office space for incremental faculty members is no longer available, and it will be very difficult for us to accommodate the growth that is expected even during the next academic year. The same applies to research space and, very significantly, to office space for additional graduate students. Although this space shortage does not seem to be fully appreciated, we anticipate a desperate situation emerging during this 2007-08 academic year, particularly in view of the desire to complete the hiring of the Canada Research Chairs and of the planned graduate expansion. It is very important to recognize that the space needs of Western Engineering are similar to those of other Engineering Faculties, but very different than those of any of the sister Faculties on Campus. Engineering research requires large pieces of very specialized equipment, special power supplies, high capacity compressed air, special ventilation, as opposed to most of the research in the sciences and health sciences, and, certainly, in any of the other disciplines. Recent examples include projects that required off campus construction, such as the “3 Little Pigs” project, as well as large installations that we have been barely able to install within our facilities, such as the Boundary Layer Wind Tunnels, the Geotechnical Engineering Pit, recently built in the Structures Laboratory of the Spencer Engineering Building, the large robotics laboratory in the Thompson Engineering Building, and the large fluidized bed simulator of an industrial process that has been erected in the Pilot Plant area of the Thompson Engineering Building. Current space allocation guidelines used by the University are completely inadequate, fail to recognize the needs of many of the Engineering research projects, and should be urgently revisited.

We have addressed many times that the replacement of the BioEngineering Building represents an opportunity to provide the space required to fulfill the current and future Faculty needs. This BioEngineering Building is becoming a significant health hazard, with the growth of molds along the walls and ceilings, the infestation of pests, and the water leakage through the roof. In addition, both heating and cooling are excessively expensive and do not properly function, and the working conditions are poor both in summer and winter. However, the space is still needed to accommodate a number of very important research laboratories and graduate student offices, and, therefore, adequate alternate space needs to become available prior to the demolition of the building. This is a very important priority for the Faculty and for the University, and one that deserves special and immediate attention.

An especially promising and exciting development, associated with the design experience of undergraduate students in all Engineering disciplines, is the proposed project of the design and construction of

a “Green Engineering Building”, a fully sustainable, green facility, designed with the direct involvement of students, using the most advanced criteria for energy conservation, materials recycling, efficiency and effectiveness. Green technologies, energy conservation and energy efficiency are elements that many organizations and individuals wish to be associated with. Such green building could become a very powerful symbol of responsibility for the University and external sponsors, in addition to representing the student knowledge and appreciation of the environmental impact of the engineering work, and the implementation of modern and innovative procedures, processes and criteria for minimizing such impact, in harmony with the environment. We envision this facility would be a showcase for The University of Western Ontario, with the potential to be recognized nationally and internationally as a sophisticated model for applying environmental research especially pertinent as energy efficiency is again in the spotlight of the public eye.

At the time when we are committing to enhanced student experiences and research-intensiveness, two parameters in which Western Engineering has shown its ability to excel, it is imperative to rapidly proceed with a decision with respect to the replacement of the BioEngineering Building and the creation of the space required even to address the immediate needs of the Faculty.

The proposed Green Building will provide 4 floors of over 11,250 square feet each, to be used as:

- Ground floor: Undergraduate Students space for mega projects, design labs, and clubs (i.e. enhancement of the undergraduate student experience).
- First floor: Graduate Student Office Space. Connected to Thompson Engineering Building by a walkway. We anticipate that this floor will provide all the necessary space for the projected graduate student expansion in the Faculty.
- Second floor: Replacement Space for BioBuilding, consisting of research labs, and offices for faculty members, post docs, visiting professors. This space will partially address the needs for faculty offices and for research space.
- Third floor: State-of-the-Art CFI laboratories for Green Technologies and Green Energy. This space is being considered for funding by CFI, as part of a very large proposal that was submitted in December 2005. The results of this CFI competition are expected by mid-November.

Space is very critical and it is becoming again the limiting factor influencing our future growth

In addition to a University capital allocation, we anticipate that such Green Building could be built by raising externally a portion of the overall costs, either with some CFI resources as well as through an appropriate fundraising campaign. The Department of Alumni Relations and Development has clearly indicated to us that

significant expressions of interest in contributing to the building have already emerged from private sector and alumni.

The Spencer Engineering Building has undergone major renovations and infrastructure improvements during the summer 2006. However, further renovations and improvements of the space within the Spencer Engineering Building is required to meet the remaining research, teaching and office needs, as well as to improve our image to the public, including parents, prospective students, donors, industrial representatives etc. Pride in the facilities will reflect pride in the work being done in the facilities. It is also very important for students. This includes essential updating of meeting rooms, offices, undergraduate and graduate laboratories and computer rooms, washrooms, as well as centrally-managed classrooms in the Spencer Engineering Building. Our plans include the periodic renewal of laboratory and computer equipment, the expansion of our fundraising efforts and the enhancement of our equipment fund endowments.

Goals:

- 1) Obtain Adequate and Appropriate Space to Fulfill Ambitions
 - a. Provide more space for student engagement activities: hands on design work, mega-project development.
 - b. Encourage consistency, equity and enforce policies
 - c. Ensure effective and efficient use of laboratory facilities for students, partnering undergraduate with graduate labs , sharing facilities between Departments and using facilities in summer for M.Eng. courses.
 - d. Provide desk space for all graduate students, in close proximity to lab facilities
 - e. Enhance laboratory facilities for research operations, in areas of strategic importance to the Faculty
 - f. Explore opportunities to locate certain research facilities within the community outside of The University, where appropriate
 - g. Ensure adequate instructional facilities with appropriate technologies to support non-conventional course delivery alternatives

13. Information Technology

Western Engineering is renewing its Information Technology strategy in order to offer enhancements to the educational experience and support the teaching, administrative and research efforts of faculty and staff, through the integration of advanced computing technologies. Proper consideration of the utilization of centralized software and hardware will be coupled with considerations for required acquisition of laptops by undergraduate students and for specialized support at the Departmental level. We anticipate a more extensive use of Web-based instruction to support the regular class work and the laboratories over the next 5 years. There is demand for video-conference facilities and associated management and support, for distance education, primarily at the graduate level. Much improved IT support of administrative and academic record-keeping functions, through the development and deployment of databases to store and retrieve accurate and timely information, is absolutely essential. As a result of increasing demand for support, two of the Departments are seeking the addition of dedicated IT technical staff to their complement.

In cooperation with central I.T. Services we are continually upgrading our network infrastructure and enhancing the security and protection of our I.T. hardware and software investments. Further to these efforts we need to review our firewall protection and ensure all users are educated about computer security issues including password vulnerability. In our central operations we are moving our server farm to a rack-mounted server configuration to enhance our maintenance efforts, increase data capacity, optimize space requirements and reduce our power requirements (especially air-conditioning).

Goals:

- 1) Aim to enhance the Managed Environment for All Faculty Computers
- 2) Encourage consistency of hardware & software standards and enforce policies
- 2) Improve the Organization and Operation of Computing Across the Faculty
 - a. Improve the communication and strengthen working relationships among computing staff and faculty
- 3) Monitor and attend to Changes in Computing Use and Needs
 - a. Monitor and attend to the use of laptop computers
 - b. Monitor and attend to the use of wireless devices and other emerging technologies
 - c. Provide leadership on the use of computing to address Faculty needs and priorities
- 4) Establish and Operate an Appropriate Distance Education Infrastructure

14. Public Investment and Accountability

Western Engineering has been discussing the need to benchmark the current situation and to carefully measure progress in the new directions that are outlined in this plan. Such benchmarking and monitoring are needed as we wish to provide full accountability for our actions, as well as to increase the visibility of our successes and celebrate them very publicly.

We propose to assign collection of data for all benchmarking to a single position in the Dean's Office. Electronic systems (databases) for storage and retrieval of data need to be developed. As the Academic Biography, a database developed by the Faculty of Engineering in partnership with the Department of Biochemistry in the Schulich School of Medicine & Dentistry currently adopted by faculty on a voluntary basis, becomes widely used, it has the potential to provide the most current data to help measure trends in research inputs and outputs and teaching. One ambition will be to develop target measures for each of the goals outlined in the Academic Plan, so we can get a better picture of the effectiveness of our strategies, re-evaluating and re-designing as necessary.

With the advice of our Advisory Council for Western Engineering (ACWE), we have discussed possible benchmarking processes, such as the implementation of an academic version of the "Balanced Scorecard". Recently, we have been contacted by the University of Hong Kong, who wishes to implement a similar benchmarking strategy.

In parallel, the National Council of Deans of Engineering and Applied Sciences (NCDEAS) is implementing a data gathering system and the identification of suitable performance indicators that will facilitate the assessment of the success of each Engineering school in relation to the others.

Finally, other comparative data, such as the National Survey of Student Engagement (NSSE) data, need to be carefully analyzed and properly compared among similar units, rather than among the Universities as a whole. Western Engineering is gathering the NSSE data for the Faculties of Engineering and will properly assess them when they will become available.

Goals:

- 1) Establish clear and effective accountability measures associated with each Goal articulated in this Academic Plan
 - a. Rationalize, when possible, the use of indicators in relation to the NCDEAS, CCPE, NSSE, and other institutional and public surveys.
- 2) Gather, compile, analyze and disseminate the accountability measures and the results
 - a. Establish the appropriate structure and staff support for data gathering, storage, access, analysis and dissemination

15. Summary

In this document, the new Academic Plan for Western Engineering, the direction for the Faculty for the next 4 years has been illustrated. Building on our enormous success and increasing ambition of Western Engineering, we are proposing a Plan that we believe realistically reflects the collective goals of providing our students with an excellent and enriched student experience within a vibrant research-intensive atmosphere. We must be proud of our accomplishments of the past, and we need to remember that we should build on the

momentum that we have created and reach measurably greater heights. We trust that, with the appropriate support, we can achieve our objectives of enhancing the student experience, aligning ourselves more closely with the best North American research-intensive schools, providing more tangible opportunities to make an impact and contribute to the local and national economies, and increasing the international visibility and recognition of our Faculty and of the University.

The proposed plan outlines the path to meet our collective goals of excellence in teaching, research, and in overall Faculty operation. Our graduate enrollment targets would bring our ratios of graduate students-to-faculty and of undergraduate-to-faculty closer to that of some of the most reputable US schools involved in both undergraduate and graduate education. This objective represents a major departure from the past, when Western Engineering was essentially viewed as a smaller version of other Canadian engineering schools with similar student-to-faculty ratios.

Increased research intensiveness, expanded graduate education, enhanced industry relations, enriched undergraduate engineering degrees designed to create tomorrow's leaders, and greater quality of students will all lead to greater impact on society and on the economy, and, consequently, increase our local, national and international reputation.

We are proposing that Western Engineering will carve its own niche in the market and achieve our vision within the next four years.