Biomedical Engineering
Strategic Plan Report Brief

April 21, 2015
Objectives

I. How large can we expand the graduate enrolment with the current faculty and research infrastructure within BME? What should be the ratio of MESc to PhD?

II. What role can BME play in a Biomedical Engineering undergraduate program? What form of undergraduate experience would best leverage the strengths of BME? (e.g. four-year program, cross-faculty option, two-year HBA type degree?) – Please see the “Biomedical Engineering Undergraduate Program Task Force Report”.

III. What is the best administrative structure to expand on the BME graduate program to support the above goals (e.g. School of Biomedical Engineering with its own budget, ability to appoint faculty)?
Current Program Overview

The interdisciplinary graduate Program in Biomedical Engineering (BME) at Western University has been in existence since 2001. The program trains graduate students to apply engineering principles to address medical problems. The BME Program is closely affiliated with four faculties: Engineering, Schulich School of Medicine & Dentistry, Health Sciences, and Science. Both Masters (MESc) and Doctoral (PhD) programs are offered. These programs are research intensive and require the conduct of original research and publication of a full thesis. There are 30 MESc and 35 PhD students enrolled. Students experience a comprehensive education that encompasses the full cycle of discovery from scientific and applied research to clinical evaluation and, potentially, commercialization. As Western’s BME graduates take their knowledge to industry, government and academia, they contribute to the advancement of biomedical engineering research. Ultimately, their discoveries contribute to improvement of human health over the short and/or long-term.

Findings

I- Graduate Program Size:

The graduate student enrolment has fluctuated between approximately 65 and 80 over the past decade. BME has supported joint positions over the past half-decade, and these new faculty members are expected to contribute to the program via recruitment and training of graduate students.

With regard to future needs, while biomedical engineering is “hot”, there appear to be no well-established metrics, at least in Canada, to address the question “Where have the graduates from BME graduate schools gone?” All graduates to date have found relevant placements, however more accurate data will be beneficial for future planning. The ratio of MESc to PhD students will be somewhat dependent on our forecasts of outcome statistics and future forecasts. At this time, it would seem that a 50:50 to 70:30 MESc:PhD ratio appears reasonable for the five-year horizon.

The current number of students appear reasonable and sustainable over the five-year horizon given the current faculty compliment. With a potential expansion in the program that may include an undergraduate program (see Section II, ahead), it is quite likely that the number of students from this training may elect to continue on to a MESc, and this will certainly impact the graduate numbers in the 5-10 year horizon.
II- Undergraduate Program:

The concept of an undergraduate program is an important component of the future. Our vision is to have an undergraduate program that fits with the current structure of engineering at Western. Also, the concept of a BME undergraduate program that caters to very highly qualified incoming students is of interest. A cohort of 40-55 students per year was favored. This program should enhance the opportunity for accelerated masters and direct entry doctoral options. Further, it is proposed that transfer students from other undergraduate programs in engineering could be accommodated.

III- Administrative Structure:

It is clear that the aforementioned proposed changes imply a different administrative structure than our current model.

Program Structure: If the undergraduate program is established as recommended in the foregoing section, then it would seem logical that BME would have dedicated faculty to ensure delivery of the new courses. It may be reasonable to consider the creation of a handful of joint positions with other departments, where the teaching commitments are properly subdivided with BME. Ideally, the current model where many faculty members from other departments are part of BME via membership will continue with the primary aim to supervise their graduate students in the program.

Management & Administration: While it is difficult to determine the precise management needs at this time, the committee was of the view that the Director or Head of BME would perhaps need a 25-50 percent commitment to the management of the program. Both a graduate and undergraduate chair would also be needed, consistent with the commitment levels of the same positions in the core departments. Also, administrators for undergraduate and graduate programs will be needed.

Facilities: The committee was of the view that a separate building or facility for BME was not essential. The current model of graduate trainees working at the various research locations is positive and should remain intact. However, it was strongly believed that a central BME hub was needed, likely in an Engineering building. This would include the administrative office adjacent to an active learning space or think-tank that could include 3D printers for prototype generation, as an example. The same facility, or perhaps an additional seminar room, would be used for the delivery of basic courses and talks for BME graduate and undergraduate students. This hub would also serve as action central for the undergraduate students in their cohort year, and hence provide a sense of home for the program.
Summary

The BME program at Western continues to be an important and integral training option for our graduate students. The program has successfully maintained momentum and has experienced growth. The concept of a more wide-ranging program that will include an elite undergraduate program with an appropriate administrative structure is strongly encouraged.

The rich clinical involvement coupled with established research programs offers an excellent and unique training ground for the undergraduate and graduate biomedical engineer at Western University.