“Challenges, Opportunities and Advocacy”

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Introduction

Chancellor,

First, allow me to express my most sincere thanks to the University of Waterloo for bestowing upon me such a great honour. As an engineer, it is especially gratifying to be honoured by an institution which has become a global leader in engineering education and research.

Celebrating the University of Waterloo

Indeed, as you all know, the University of Waterloo is celebrated as Canada's *premier* engineering school. There are many reasons for this top ranking: First, the University's creativity in both *teaching* and *learning*, symbolized by its *co-operative education program*. Now world-famous, the co-op program has given each of you, the academic and practical *knowledge, skills*, and *experience that will allow you to compete on a global scale.*

The University of Waterloo also fosters the growth of emerging multidisciplinary areas in engineering education. This year, it has witnessed with pride the first graduating class in mechatronics, the only program of its kind offered in Canada.

Engineering at the University of Waterloo is known as well for its strong commitment to *research* and *innovation*, and for an *entrepreneurial spirit* that is second to none.

This winning combination has led to tremendous successes over the past five decades: from the development of the *WATFOR* compiler, the creation of *WATCOM,* the launch of highly successful spin-off companies such as *Waterloo Maple* and *OPEN TEXT*, to your innovative partnership with global communications leader *Research In Motion.*

The Faculty of Engineering also stands as the national leader in the transfer of *ideas* and *technology* to the private sector. Indeed, more Canadian high-tech and knowledge-based spin-off companies trace their roots to the University of Waterloo than to *any* other school.

It is no wonder, then, that Microsoft Chairman Bill Gates, in his recent visit to this campus, described the University of Waterloo as a very "special" place. So I am really honoured to have the privilege of now being able to call myself a graduate of the University of Waterloo.

In the next few minutes, I would like to reflect on some of the *challenges facing the engineering profession in Canada, as well as on the many opportunities* it has to offer to *you,* who represent the upcoming generation of engineering leaders.

I believe that by embracing these challenges and by seizing these opportunities, the graduates of the class of 2008 have the potential to *transform* the engineering profession, to create more diverse, stimulating and rewarding careers for themselves*, and to contribute to Canada's* increased prosperity in the years ahead.

Challenges

1. How should the engineer of the 21st century be trained ?

Let me start with the first challenge. *How should the engineer of the 21st century be trained ?* The need to "reengineer" engineering education is pressing due to (a) the explosion of knowledge, (b) the growing complexity of societal problems, (c) the worldwide reach of these problems and (d) the demands of a highly competitive global economy.

So, how can we ensure that engineering education is well aligned with these needs?

First, we have to incorporate more *business*, *management* and *entrepreneurial* skills into engineering programs, and to foster more effectively a *culture of innovation*. With its programs in emerging areas such as nanotechnology and mechatronics and its forward looking V*ision 2010* strategic plan for educational innovation, Waterloo's Faculty of engineering is clearly on the right track.

There is also a strong consensus that engineers of the 21st century must be broad thinkers who appreciate the global and societal implications of engineering and value the critical links between technology and society. In 2001, the 2020 Engineering Forum[1] held in Ontario concluded that engineers had to acquire skills leading to "*social, global and political awareness*" and to "*ethical decision making*". It called for a more flexible definition of engineering by promoting interdisciplinarity, a better balance between "technical and artistic training" and more emphasis on teamwork and communication skills.

The 2005 Report of the American National Academy of Engineering[2] recommended similar changes to adapt engineering education to the needs of the new century.

2. Attracting more women in engineering education

Incorporating these changes will enable engineering education to respond to another key challenge: *attracting more women in the profession*. Waterloo, like other universities in Canada and abroad, still faces the continuing under-representation of women in engineering studies. In fact, since 2001, female participation in undergraduate engineering in Canada has fallen from 23 to just 17%.

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[1] http://www.peo.on.ca/publications/Reports/Proceedings_2020.pdf
[2] http://www.nae.edu/nae/naepcms.nsf/weblinks/MKEZ-6EFH6V?OpenDocument

Several factors can explain this decline, including an overly rigid and heavily prescriptive curriculum, the enduring image of engineering as a "male-dominated" profession and the attraction of the life and bio-sciences. However, there is ample evidence that a more creative and socially relevant curriculum tends to bring and retain more women into engineering studies. Their stronger presence in fields such environmental engineering and biomedical engineering confirms that women tend to internalize engineering as a helping profession.

In fact, in 2006, National Engineering Week celebrated engineering as "a caring profession". Canadian engineers need to impress more on the public this key dimension of our profession, exemplified so well by "Engineers Without Borders[3]" that has its roots at the University of Waterloo.

3. Enhancing the profile of our profession

This brings me to another challenge we face as engineers, which is raising the *profile* of our profession.

It has been said that engineering in this country is an *invisible profession.* Canadians only have a vague and limited idea of what we do; at the same time, the engagement of engineers in public policy issues has been virtually absent. As a result, our national consciousness is not aware of the role engineers play in medical research advances, in alleviating human suffering, in creating the iPOD that puts 40,000 songs at our fingertips or in developing the BlackBerry smartphone!

If we want to cast away this "cloak of invisibility", we need to get the word out about the work we do, so that Canadians fully recognize the benefits we provide for our society.

A new world of engineering opportunities

Indeed, this is an exciting time to be an engineer! More than ever, engineering education offers graduates *diverse* and *dynamic* ways to make a difference.

Increasingly, employers are looking for engineers who are, what they call, *"entrepreneurial integrators".* That is, c*reative people* who bring together pieces of various disciplines to *make projects happen.*

Canadian engineers are indeed applying their creative talents and entrepreneurial skills to a broad range of exciting fields and to all aspects of life, from product design and software development, to marketing and project management, from communications to transportation, from space exploration to health and medicine, and to just about everything in between. The sky is, *literally,* the limit!

[3] http://www.ewb.ca/en/index.html

By taking advantage of all these opportunities, and by continually expanding your professional horizons, you will enrich your *own* careers, while projecting to the public an image of engineering that corresponds to what it really is: a *forward-looking* profession!

Those familiar with the history of engineering know that creativity has long been a distinguishing feature of our profession. As Albert Einstein once observed "scientists investigate **that which *already is*;** engineers create **that which has *never been*.**"

Many paths to success

Engineering graduates also have the opportunity to pursue *many* paths leading to success. This is certainly what *I've* learned personally over the years. My own career has taken me from business to research, back to business, on to university administration, culminating in my appointment as President and Vice-Chancellor of the uOttawa.

While this non-linear career was rather *unusual* for engineers of my generation, all seems to indicate that it will be the *norm for your generation*. That's why I encourage you to be constantly open to new ideas, opportunities and experiences as you progress through your own career.

You are leaving here today with a *degree* in hand. But your education is only *just beginning;* indeed, I urge you to consider yourselves as lifelong learners eager to continuously expand and broaden your knowledge.

Advocating for education

In closing, I would like to insist once more on the value of *education*.

Like Chancellor Lazaridis and President Johnston, I am a passionate *advocate* for education and the promise it holds for our country. As you embark on your engineering careers, I encourage each of you to join us and to become public *advocates* for *education*.

Why? Because *education,* rather than *location,* is the key to Canada's future economic and social success[4].

Conclusion

There is no doubt in my mind that the Waterloo engineering class of 2008 is *more* than up to those challenges I have identified earlier.

On this special day, I take great pleasure in congratulating you on your academic achievements … and in wishing each and every one of you a *creative* and *productive* career in one of Canada's most *innovative* and *rewarding* professions.

[4] CD Howe

Congratulations and all the best! Thank you.