Submission #4

Motion for PEO AGM.
Title: Discipline Specific Licensing of Engineering and Science.

Whereas:
PEO continues to decline in relevance to the engineering community as evidenced by the fact that over 60% of engineering graduates do not join PEO; and,

Whereas:
Many of the new engineering graduates who do join PEO do not have exclusive rights to practice and essentially have only a right to use the title “P.Eng.”; and,

Whereas:
PEO has forgotten the meaning of exclusive rights to practice as evidenced by the fact that fewer than 20% of PEO members have such rights; and,

Whereas:
PEO membership represents only about 87,000 engineers in Ontario out of over 285,000 who have engineering credentials in Ontario; and,

Whereas:
Scientists continue to discover new science, some of which they apply to useful works that impact people and may therefore be practicing engineering. The number of non-engineering STEM graduates per year is twice the number of engineering graduates; and,

Whereas:
PEO has failed to respond to the growth of new science and engineering practices, such as - Software Engineering, Cyber Systems Security Engineering and Nano Molecular Engineering;

Therefore, be it resolved,
That, this AGM recognize that PEO is no longer capable of preventing the decline of the profession with respect to the proper licensing of new engineering and their exclusive rights to practice, and,

That, PEO work with ‘Engineers for the Profession Incorporated’, to lobby the Ontario government for legislation that will create new discipline specific regulatory bodies that will properly license and regulate all modern engineering and applied science practices whose works have a significant public interest impact.

Moved By:
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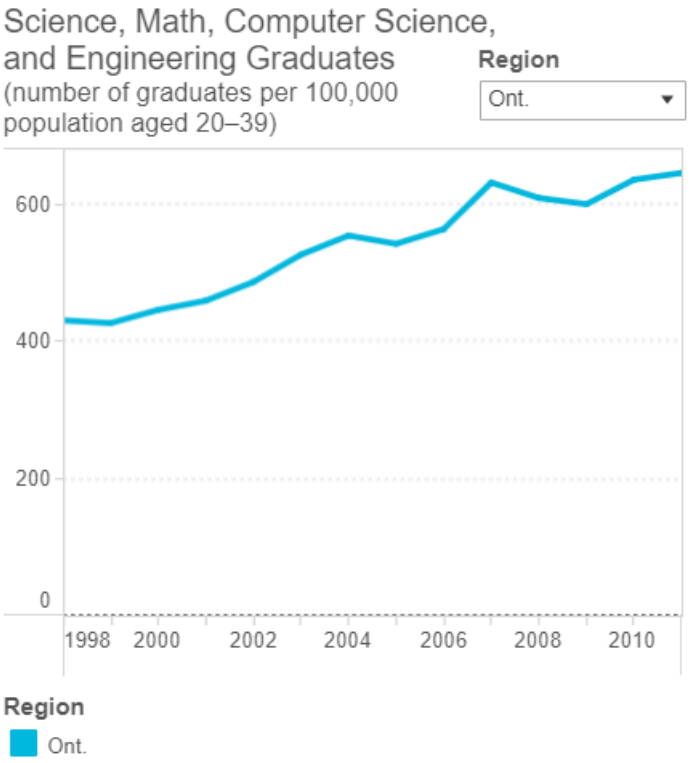
Former PEO Pres 2000-2001
President, Engineers for the Profession Incorporated

Seconded By:
Eng. Roger Jones, B.Sc(Eng), DIC, M.Phil, MBA, Life-Senior MIEEE, P.Eng, FEC.
Former PEO Councillor
Treasurer, Engineers for the Profession Incorporated

Some references and support data

This is a USA stat showing that several engineering practices expect a Master's Degree.
https://www.gradschools.com/programs/math-science-engineering?in=ontario

# of Graduates in STEM in Ontario
https://www.conferenceboard.ca/hcp/provincial/education/sciencegrads.aspx



Ref:
https://www.google.com/search?q=Ontario+population+in+2011&rlz=1C1CHBF_enCA936CA936&oq=Ontario+population+in+2011&aqs=chrome..69i57j0i333.7750j0j15&sourceid=chrome&ie=UTF-8

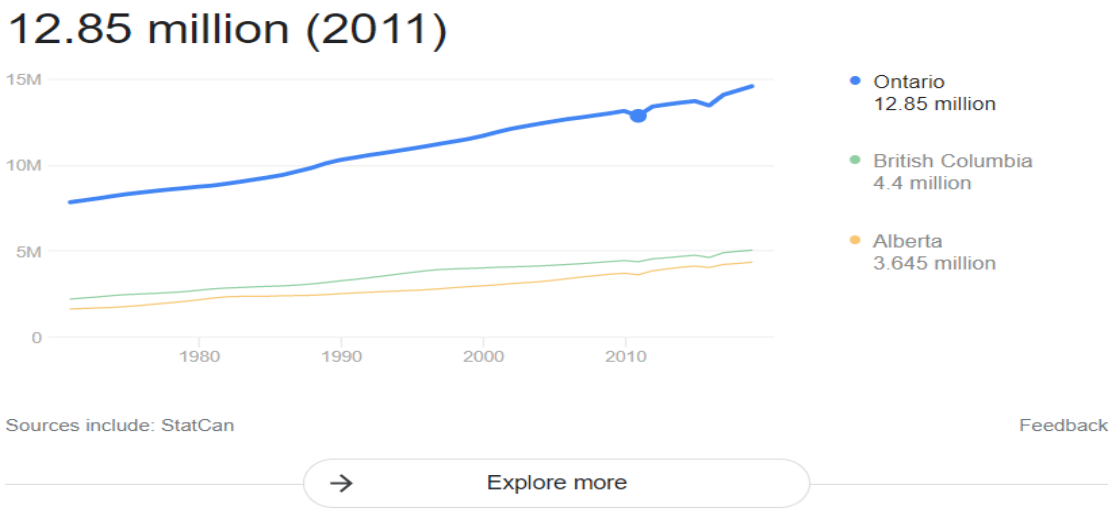


Figure 1 Ontario Population

Approximate Ontario STEM Grads in 2011: 650 per 100,000
Ont Population in 2011: 12,850,000

STEM grads = 12,850
Eng grads ~ 4,600
======
Non Engineering STEM = 8,250

There are twice as many science and math grads per year to engineering grads.

# of Canadian Engineering grads per year: 12,000
Approx # in Ont grads = 12,000 * 38% = 4,600

See:
https://www.google.com/search?rlz=1C1CHBF_enCA936CA936&q=How+many+engineers+in+Canada&sa=X&ved=2ahUKEwjn2LXkgqDwAhWNHM0KHaXPCfMQ1QIwGHoECCQQAQ&biw=1536&bih=722

2011 Cdn Population ~ 33.5 million
Ontario is 12.85 / 33.5 = 38% of Canada
https://www12.statcan.gc.ca/census-recensement/2011/as-sa/98-310-x/98-310-x2011001-eng.cfm

Stats on Engineering in Canada:
https://www.linkedin.com/pulse/canadian-engineers-crisis-under-employment-after-graduation-zhang/

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OSPE Survey:
https://www.ospe.on.ca/public/documents/advocacy/2015-crisis-in-engineering-labour-market.pdf

FIGURE 2

Trends since 1996 census – Ontarians with degrees in engineering compared with those reporting they work in engineering

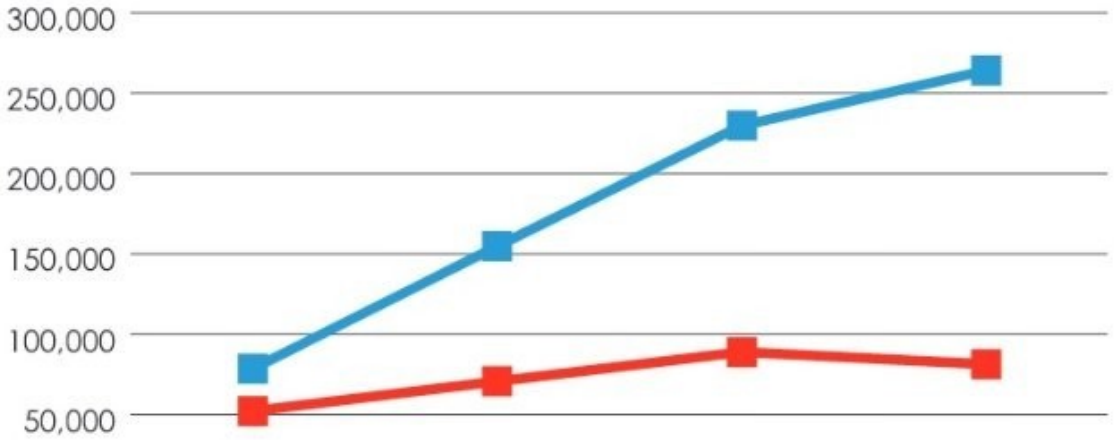
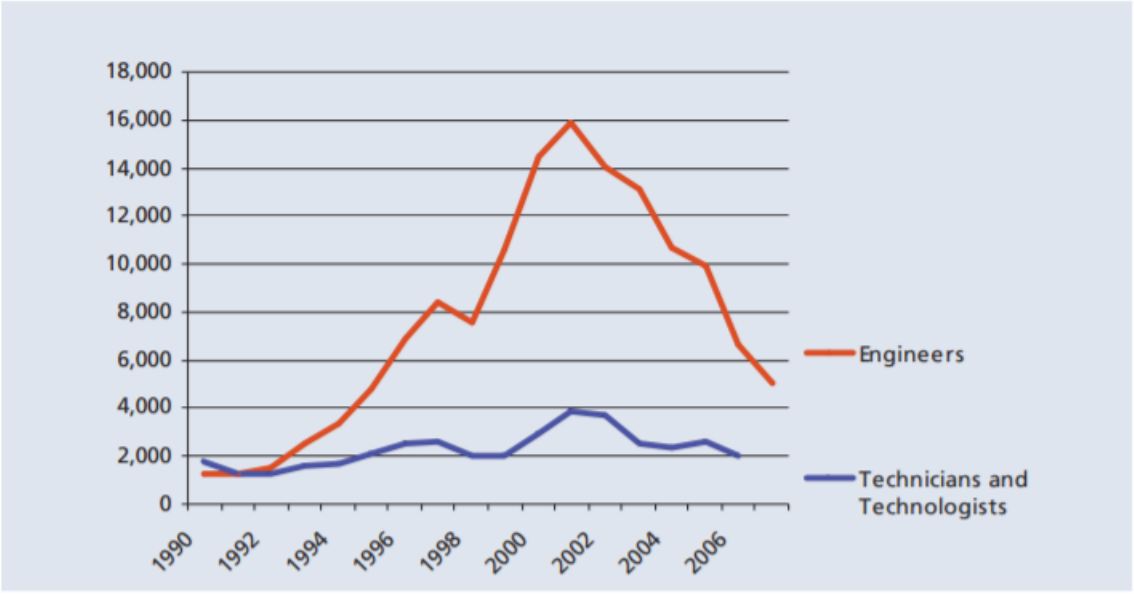


Figure No. 8
Immigration of Persons whose Intended Occupation was Engineer or Technician/Technologist, 1990-2007
Citizenship and Immigration Canada (Labour Market Tracking System Source Files–Canada)



Source:
http://www.ogrady.on.ca/Downloads/Papers/Engineering%20And%20Technology%20Labour%20Market%20Study%20-%20Final%20Report.pdf

More engineers immigrate to Ontario than we graduate per year. A large majority of Ontario engineering grads cannot find engineering work.

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2019 LICENSING STATISTICS

Total P.Eng. applications
6852
male 82% / female 18%

Total applications for P.Eng. licence received from CEAB candidates
3327
male 80% / female 20%

Total applications for P.Eng. licence received from non-CEAB candidates
2982
male 85% / female 15%

Total number of P.Eng. applications processed and approved
4102
male 83% / female 17%

New P.Eng. licences approved for CEAB graduates
2117
male 81% / female 19%

New P.Eng. licences approved for non-CEAB graduates
938
male 84% / female 16%

P.Eng. licences approved for transfers
915

P.Eng. licences approved for reinstatements
120

New limited licences issued
27

New certificates of authorization issued
513

New consulting engineering designations issued
45

Source: https://www.peo.on.ca/sites/default/files/2020-05/2019-AnnualReview.pdf
Accessed April 28, 2021

Discipline Specific Licensing

Proposal

By Peter M DeVita, MASc, MBA, P.Eng., FEC
President of Engineers for the Profession Incorporated

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1 Preface

Today, over 80% of PEO's 87,000 members are in the same position as me in 1975, having a P.Eng. with no rights to practice. Essentially, we have the prestige of the P.Eng. title and nothing more. You can call it what you like – a pretend licence or a fake licence – but it is not a true license with exclusive rights to practice.

Hello, my name is Peter DeVita. I am a former President of PEO, and former President of the Canadian Society of Professional Engineers, past Board member of Engineer's Canada, past Board member of OSPE. Indeed, I helped to create OSPE. This is enough to say that I have volunteered with the profession for over 45 years. I can tell you we are loosing relevance quickly and in serious trouble.

I will review several statistics with you on why I believe the profession needs to rebuild itself and how we can do it. Then it will be up to you to exam the facts and decide whether you want to help in re-building. As President of the newly created Engineers for the Profession Incorporated, we are dedicated to bringing about a significant metamorphosis of the profession.

To do this, we are proposing that major disciplines of engineering must have their own licensing body. This concept is closely related to the original (A)PEO Council in 1922 wherein the 5 major 'Branches' of the day, performed the main regulatory functions for their Branch.

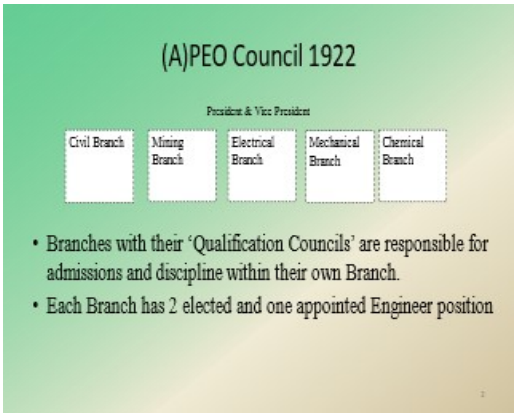

Figure 1: APEO Council Structure 1922

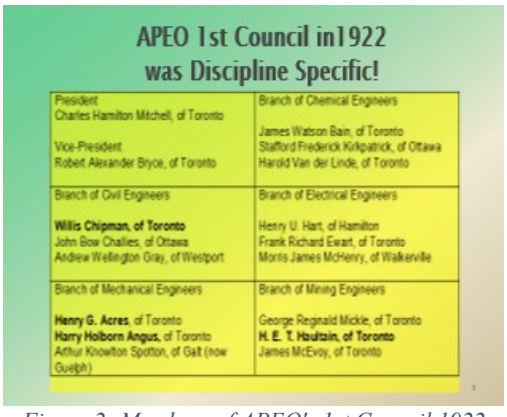

Figure 2: Members of APEO's 1st Council 1922

Let's look at the data.

2 Background

In 1975, I was a young graduate engineer with a Master's degree in the cross disciplines of Computer Engineering and Environmental Science. Not a lot of job potential for this despite the looming concerns about the environment. I vividly recall writing my letter to the Canadian Society of Professional Engineers (CSPE), a newly formed engineering advocacy body, responding to their first promotional brochure. I knew enough about my new P.Eng. to know that Computer Engineers did not have any exclusive rights to practice with our so-called engineering licence similar to what Civil Engineers had. Part of my letter asked if CSPE would advocat for this?

Little did I know that Dr. Walter Bilanski would read my letter. Within a year I found myself on the Board of CSPE. I was put in the position of what would become a lifelong advocacy to establish

rights to practice for all modern engineering, those practices that emerged and began to flourish along with the industrial revolution from the late 1700s.

Over the last 45 years I have advocated that PEO properly license all engineering practices and to not continue to mislead young engineering graduates. This was and is fundamentally dishonest.

I completed 10 years on the CSPE Board, 2 years as its President, I moved to the PEO Council in 1990. Few of my fellow Councilors understood this idea of rights to practice. Upon reflection, one could see that the majority of Council were Civil Engineers. That is no surprise. They have rights to practice, so their livelihood depends on having their P.Eng. They naturally have a stronger interest in the profession.

This is not pejorative. It is simply a recognition of the PEO Council culture. We are all subject to a cultural filter conditioned by how we grew up and our environment, Most Councilors assume that all practicing engineers must have a P.Eng. to do engineering. This is not so.

Recognizing our personal filters is a challenge. It is easy to understand why PEO Council would not have made much progress on an issue that was foreign to the majority of Councilors' context.

These same perspectives were true on the Board of CCPE (now Engineers Canada) when I joined the Board in 1999. In one of my addresses to the Board, I used the analogy of the driver's licence to explain the concepts. Such a licence gave an individual the right to drive on public roads. Simply having the skills is not sufficient. An impartial authority had to test you and confirm that you have the competence to drive a vehicle.

I also had come to the conclusion that a massive move to suddenly establish rights to practice for all new engineering practices since 1922 was not likely to be understood or to succeed. I decide that the only approach that would make sense was to start with a couple of new areas of practice that few Councilors would know or care to oppose. We chose Bio Engineering and Software Engineering. We called these "emerging disciplines".

The concept seems to have caught fire. The idea that Software Engineering was a new practice of Engineering was championed by CCPE (now Engineers Canada).

In 2000, CCPE (now Engineers Canada) led the engineering profession in a Supreme Court of Canada law suit against Memorial University for the use of the term 'Software Engineering' in the Computer Science program. The Canadian Universities were drawn in to support Memorial. After spending over a million $ by each side on legal fees, I can assert that Software Engineering and the concept of emerging disciplines were firmly established in the minds of engineers.

3 More Evolution

As President of PEO, I convened the "2020 Engineering Forum" on Mar 31, 2001, wherein engineering leaders from the Engineering Institute of Canada (EIC), the Universities, OSPE and PEO presented their perspectives on where the profession was going over the next 20 years. It was the first and only time these entities assembled in one room. In the abstract I wrote,
" The growth in 'certifications' ...can be interpreted as an expression of the public's desire to identify qualified people so that it can achieve a measure of protection. Licensing can be viewed as certification with legal enforcement added. The important point to note is that these certifications are highly specific to distinct areas of practice. Hence, to increase the relevance of the P.Eng. licence, the profession must learn how to implement "Discipline Sector Segmentation". ***In future, a generic P.Eng. will not be good enough.****"*

4 A Key Statistic

In 1997, CCPE (EngCan) hired a survey firm to collect one of the first modern sets of comprehensive statistical data on the Canadian engineering profession [1]. The survey provided the data below in response to the question:
"How important is membership in your provincial (territorial) association?
Answer Options were:
a) Essential
b) Useful
c) Not important."

All Engineers in Canada (166,000 in 1997) were sent the survey.
The results are shown in Figure 3.**Error! Reference source not found.**

- For the Overall membership findings included:
  - 31.9% or professional engineers stated that Association Membership is "Essential"
  - 39.8% stated that it is "Useful"
  - 25.4% stated that it is "Not Important"

Figure 3: Importance of P.Eng.

I doubt that many see that this question directly measures the per cent of P.Eng.s who have exclusive rights to practice. The Dec 2003 report [2] page 9 states that the 31.9% dropped to 22%. This is a 10% drop in 6 years. The estimates today put this 'essential' % to below 20%.

Consider asking yourself this question for your driver's licence.

How important is it for you to have a driver's licence to drive on the public roads?

Answer Options are:

a) Essential
b) Useful
c) Not important.

If you have a driver's licence you know there is only one 'correct' answer. You MUST have a driver's licence to drive on the public roads. If you cannot say that you MUST have your P.Eng. to do your work, you do not have exclusive rights to practice. If you must have your P.Eng. to legally approve designs, then you do have exclusive rights to practice.

This is the fundamental point. Understand this and you understand what an engineering licence should be and how it is only this recognition of competence to practice that will 'serve and protect the public interest.' This is a necessary condition.

5 Supporting Statistic

Figure 4 from the same report supports my previous premise that Civil Engineers place the strongest importance on the P.Eng. The lowest importance was given by Computer Engineers.

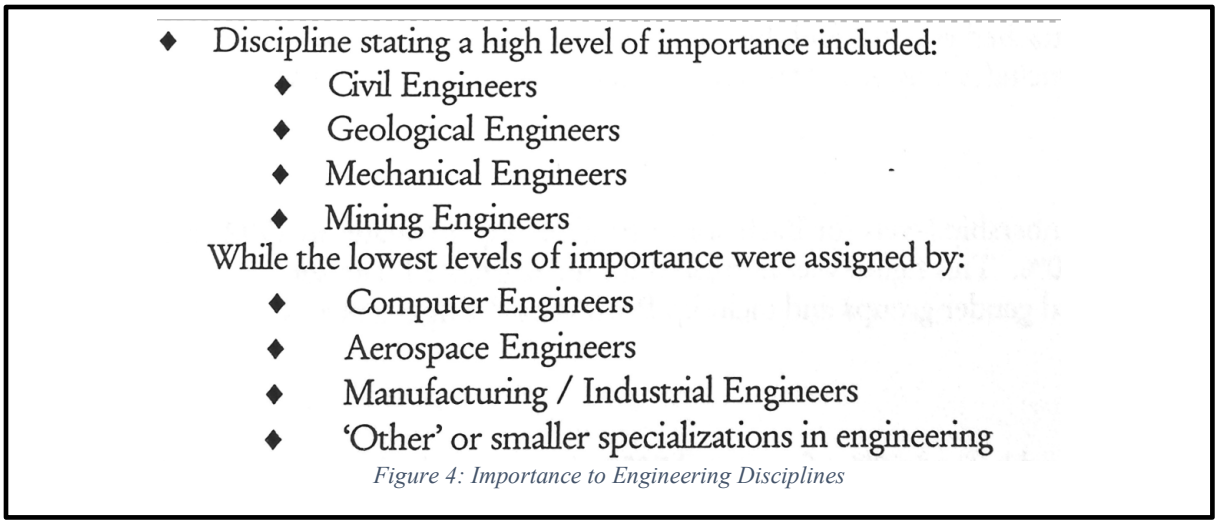

Figure 4: Importance to Engineering Disciplines

6 Do Exclusive Rights to Practice Matter?

By definition, a **'Licence is an exclusive right to practice an occupation.'** Without these rights one does not have a licence.

Apply this question to the driver's licence example. Does it matter that all drivers on the public roads have a legally authorized driver's licence? If we expect to protect the public from incompetent drivers there is only one answer. The same holds true for any professional practice that can significantly impact the public interest.

Indeed, **the ONLY justification for an occupational licence is the protection of the public interest.**

We are therefore faced with some basic conclusions. Either an engineering practice significantly impacts the public interest, or it does not. If it does, it MUST be properly licensed with rights to practice. If it does not, then a licensing designation should not be used to identify such members. They only have a right to title not a right to practice.

7 Our Current State

Figure 5 reflects the current status of people with engineering credentials in Ontario.

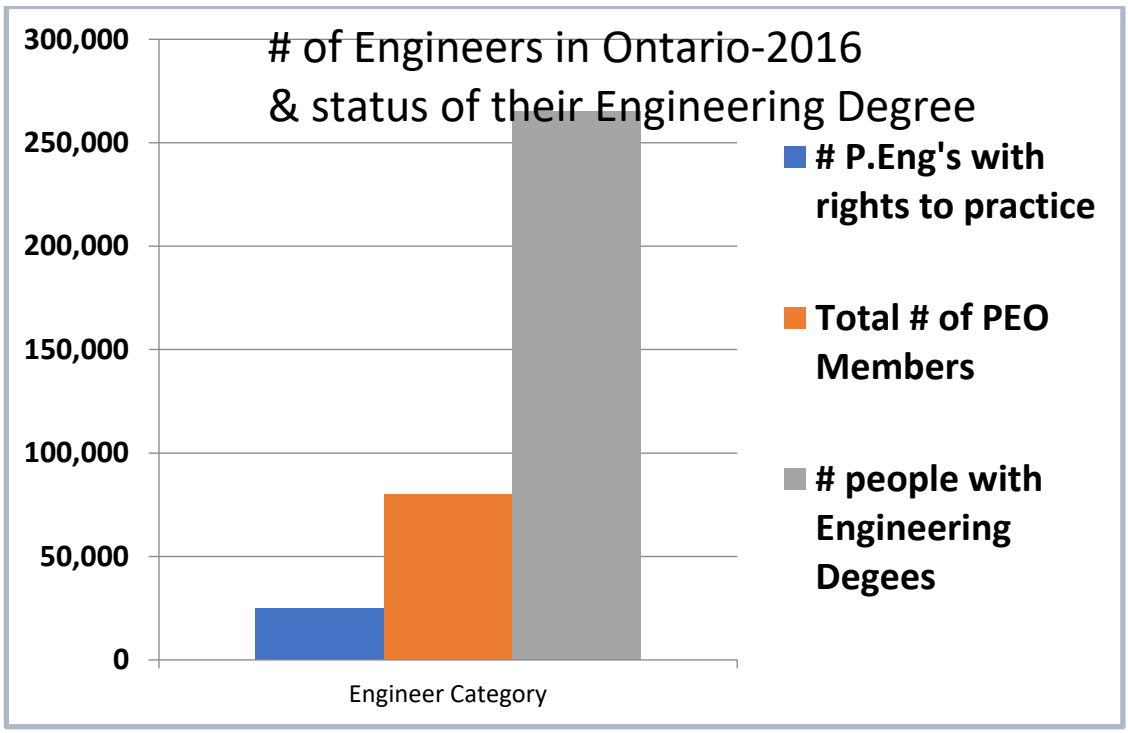

Figure 5: People with Engineering Credentials in Ontario

PEO members now account for about 30% of all people in Ontario that have engineering credentials. About 20% of PEO's members have rights to practice. This is about 9% of all people in Ontario with engineering qualifications. This is the flea on the tail trying to wag the dog.

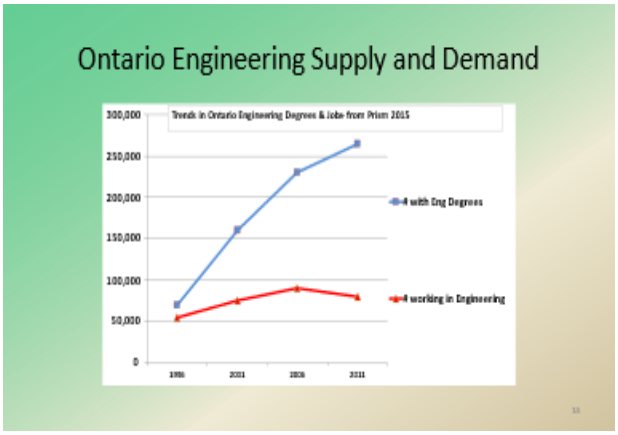

Figure 6: There are now 4 engineers per engineering job!

The numbers do not include scientists who have decided to do some engineering that impacts the public. There are about twice as many scientists that graduate each year than engineers. Hence, figure 3 under estimates the number of people who might do engineering work in Ontario.

Ontario has a significant oversupply, or, underutilization of its engineering talent.

8 Proliferation of Practices

The 'uptake' rate (% of engineering graduates who get their P.Eng.) continues to steadily decline particularly in the high tech sectors where the engineering practices have little to no rights to practice.

Software Engineering has never had more than a few % getting their P.Eng. and is now close to 0%.

The uptake rate by province shows that Ontario is in the worst position. This is partly due to the higher number of new engineering disciplines practiced in Ontario.

The Essential vs Useful rating by discipline is consistent with those who have rights to practice and those who do not.

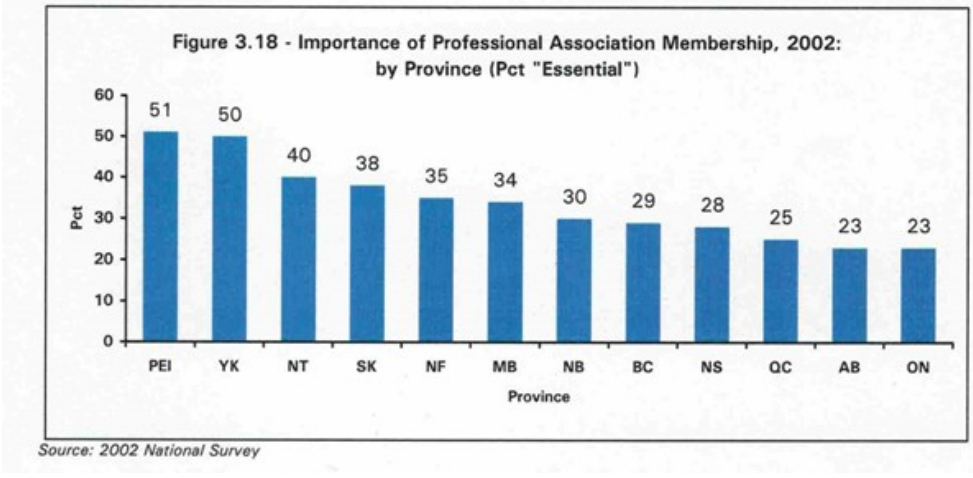

Figure 7: Importance of P.Eng. by province

TABLE 3.9 – LICENSURE UPTAKE RATES BY DISCIPLINE: 1997 to 2002
ALL UNDERGRADUATE STUDENTS

Discipline	Year of Graduation					
	1997	1998	1999	2000	2001	2002
Biosystems	61.1%	57.5%	53.2%	62.3%	45.1%	48.7%
Chemical	55.0%	58.2%	39.3%	41.1%	42.7%	36.6%
Civil	72.8%	71.6%	61.6%	54.1%	49.6%	43.5%
Computer	27.2%	28.3%	21.2%	21.5%	22.1%	18.7%
Electrical	35.7%	38.0%	29.2%	27.7%	27.3%	24.6%
Engineering Science	21.7%	20.0%	12.7%	9.0%	12.0%	12.9%
Environmental	56.3%	53.5%	35.8%	34.2%	30.7%	25.9%
Geological	79.6%	73.5%	65.9%	76.4%	98.0%	56.1%
Industrial & Manufacturing	63.8%	64.8%	55.1%	54.4%	55.4%	51.0%
Materials & Metallurgical	45.3%	52.1%	46.3%	37.8%	38.3%	39.7%
Mechanical	61.5%	62.0%	44.3%	44.9%	42.6%	35.8%
Mining/Mineral	60.2%	48.2%	48.8%	50.0%	44.1%	53.4%
Software	- -	- -	- -	- -	2.8%	2.4%
Other	66.1%	45.5%	55.5%	39.2%	32.7%	85.8%
Total	**53.0%**	**52.8%**	**40.1%**	**38.4%**	**36.5%**	**31.6%**

Source: The Corporate Research Group Ltd., based on data supplied by the CCPE and its Constituent Members.

Figure 8: Uptake by Discipline

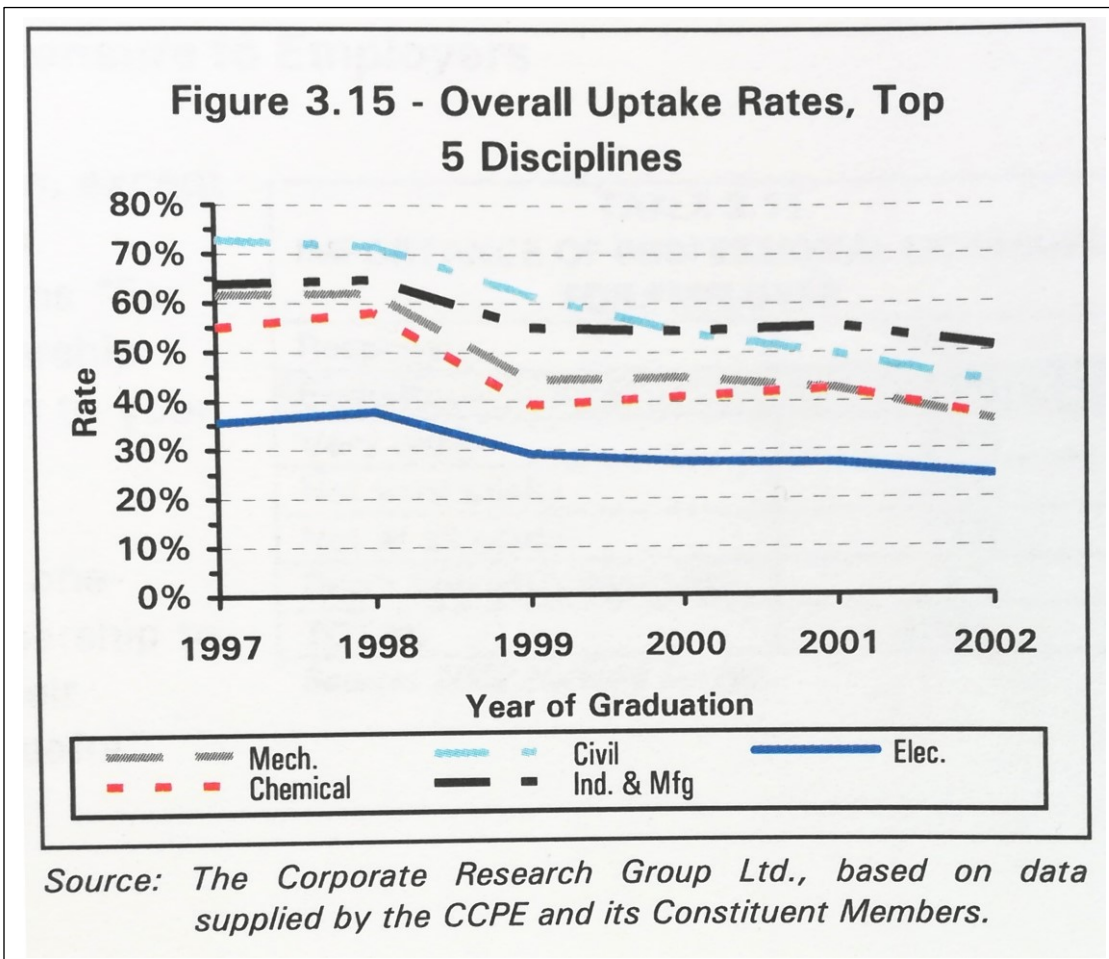

Figure 9: Uptake Trends by Major Discipline

9 Parting of The Ways

In 1922 APEO recognized 5 major Engineering disciplines. Each had its own 3 Councilors (see Figure 2) to look after regulatory matters for that discipline. This was a sensible split that recognized what the EIC had discovered in its reform in 1918. Engineering disciplines have unique characteristics and cannot simply be lumped all together.

This principle was violated in the 1969 revision of the Act in which PEO went to geographic representation by Councilors. This effectively threw out the baby with the bath water.

Council had been given an alternative approach in 1952 with what would have been the first umbrella legislation in Canada. The profession acted on the basis of a dominant minority who did not fully understand the plight of those without exclusive rights to practice.

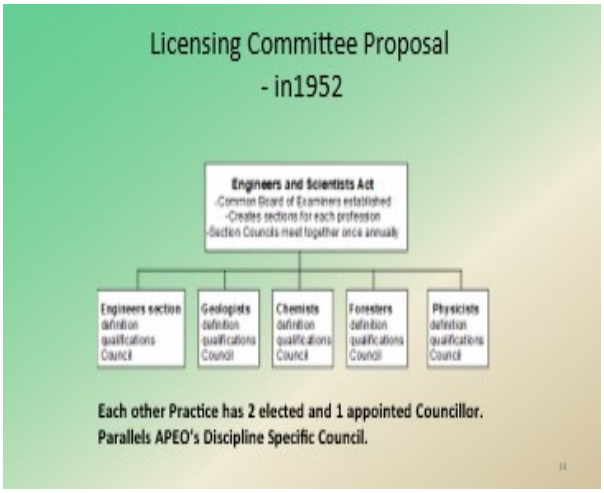

Figure 10: 1952 Proposal to Council for a multi Discipline Specific licensing organization.

10 Irrelevance to Oblivion?

It is clear that our regulated Profession has slipped into irrelevance. When only 30% of people with engineering credentials are PEO members, we are already in the minority. When only 40% of gradating engineers see PEO as relevant, we have more engineering talent growing outside the profession than within. The high tech sectors like Software and Computer engineering have already decline to minuscule uptakes rates.

The Profession requires a major transformation to move beyond its current position. If we do not do so, engineering will become the first of the senior professions to lose its self-regulating status. PEO will devolve to a membership of a few thousand “construction-related engineers”, and the public will be completely unprotected in the majority of important areas of engineering, applied science and technology.

11 The Way Forward

It is clear that distinct disciplines must regulate their practices. This is the basis of self-regulation and peer review. Peers mean those who are from the same practices. Our Academics and Experience requirements committees have maintained this approach because it is the only way to admit new people to the profession. One shoe does not fit all. One P.Eng. is not the same another. There are many flavours and these must be recognized.

Regulating by discipline specific licensing bodies is more than recognizing the academics and competence of an individual. It is also about members of a discipline associating to deal with the 'street level' issues in their practices. Across all engineering, these explode into a myriad of issues at the working level, each specific to the character of the discipline.

We can begin by anchoring ourselves with the Council division of 1922. Then ask ourselves how these have grown since then. Consider where entirely new practices have evolved (Software Engineering for example). For each major new practice, we need to come to terms with their scope of practice and the core body of knowledge required. Then progress to what these new branches of engineering do in the field. Where is the impact on the public interest? And, finally, what is the licensing and demand side legislation required to establish proper rights to practice?

Engineers for the Profession Inc have set themselves the task to accomplish this transformation of the profession. We hope that PEO and those in traditional practices will understand what we are trying to do and help us build a stronger engineering profession that is quadruple in size to the current PEO.

Thank You

April 30, 2021
President, Engineers for the Profession Incorporated.

Post Note:
Engineers for the Profession Incorporated would like to hear your views. We encourage you to engage with us and make a difference to our profession. It needs dramatic change. Join us.

For more information see us at:
https://engineersfortheprofession.ca/resources

12 References

[1] CCPE (now Engineers' Canada), "1997 National Survery of Professional Engineers and Professional Geoscientists: Supplement Report," Canadian Council of Professisonal Engineers, Ottawa, Ontario, 1997.

[2] CCPE, "CCPE Licensure Uptake Study final draft, CRG File No. 03-175," The Corporate Research Group Inc. contracted by CCPE (today Eng Can), Ottawa, 2003.