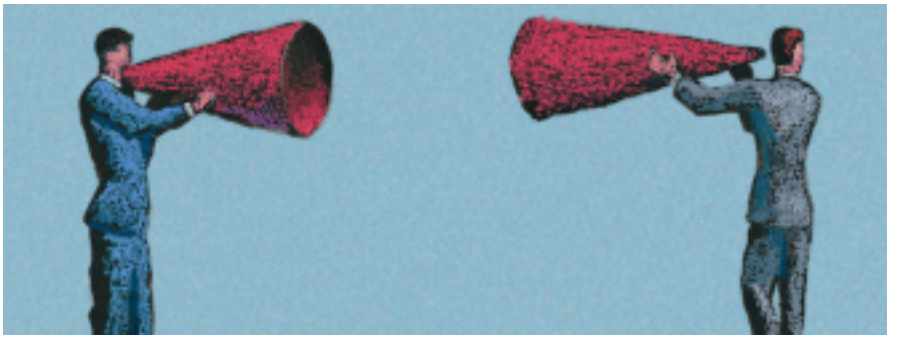
Exclusive scope of practice in non-traditional disciplines

By Bruno Di Stefano, P.Eng.



Protecting public safety is not static. Emerging technology puts new pressure on regulators to ensure that practitioners continue using their professional expertise for the greater public good. Despite uncertainty as to what constitutes the full scope of practice for engineers, is it time for regulators to make a concerted effort to cover all the areas already identified as requiring an exclusive scope of practice? Here's one view.

I believe that to better protect the public, PEO should work with the provincial government to establish the areas where an exclusive scope of practice is warranted for professional engineers practising in non-traditional areas. I take "scope of practice" to refer to the permission granted under a professional licence to perform certain activities. Only those holding the licence may perform the specified activities–for example, a doctor has "exclusive" scope of practice with respect to surgery on patients. Such a move can be undertaken within the existing regulatory/licensing framework. At no time am I lobbying for or assuming a different *Professional Engineers Act*, or a revised licensing model. I suggest that "exclusive scope" associated with a true licence can be structured in law in the following ways:

- supply-side legislation (the *Professional Engineers Act*, for example) that explicitly states through its definition of practice what only an engineer is permitted to do;
- demand-side legislation and/or regulations (such as those created in the aftermath of the Walkerton tragedy) that state in relation to particular areas that impact on public safety what only an engineer is permitted to do;
- PEO enforcement activity, which is upheld by the courts, creates exclusive scopes via common law precedents;
- enforcement activity that is concluded by out-of-court agreements (which can have significant influence on "scopes").

For historical reasons, demand-side legislation is limited to traditional engineering disciplines. However, examples of major loss of life and wealth are common in newer and emerging disciplines. As a result, I suggest that PEO should also act to identify the areas requiring an exclusive scope of practice in the newer and emerging fields. This would be within PEO's tradition and mandate, particularly in terms of working with government to develop demand-side legislation covering areas in which an exclusive scope of practice for licensed P.Engs is necessary to protect public welfare.

While other professions have been rather successful in establishing an exclusive scope of practice, the engineering profession has claimed a rather limited territory. Indeed, the bulk of existing demand-side legislation seems to be related to civil and structural engineering. This is due in part to history. In 1937, the loss of life and wealth caused by earlier bridge and building failures led the Ontario government to legislate that only duly qualified professional engineers should be allowed to design bridges and buildings. I argue that in one sense, PEO has had authority for defining exclusive scopes of practice since 1937, but very little has been done over the last seven decades to identify new scopes of practice.

With the enactment of the *Professional Engineers Act*, it was understood that the engineering profession was "closed" to non-qualified individuals, and licensure was made mandatory for anyone practising professional engineering.[1] Similarly, after the tragic loss of human life at Walkerton, PEO called for participation of professional engineers in the operation and management of water treatment works and identification of appropriate solutions or circumstances where professional engineers should be required to supervise and be accountable for the management and operation of engineered infrastructure, including water systems.[2]

Former PEO President Peter DeVita once noted, "it is … characteristic of the newer non-traditional areas that demand-side legislation is very small to non-existent."[3] Indeed, I would say that in the newer, non-traditional areas, we are still in the pre-1937 era–the public and the provincial government have not yet realized the magnitude of loss of life and wealth that can come about from failure of poorly engineered systems.

To a certain extent, it's possible that the negligence of working engineers comes into

play on this issue. We should do more to educate the public and the government, both as individuals and as a self-regulating profession. One good place to start is right within PEO. The Engineering Disciplines Task Group (EDTG), which I chaired from 1998 to 2002, developed a licensing process for individuals practising in emerging areas. The guidelines are consistent with PEO's traditional licensing process, and they have been tested through licensing software engineering practitioners since 1999.[4] PEO Council approved the process formally in February, 2002. It consists of five phases:[5] **discovery; identification; definition; evaluation; and legislation.**

The first four phases of the process have been tested for software engineering and for bioengineering. To the best of my knowledge, the legislation phase–identifying areas within the emerging field where an exclusive scope of practice for licensed P.Engs is necessary to protect the public (and working with government to develop demand-side legislation covering those areas)[6]–has not yet been pursued.

Let's focus on software engineering failures for the purpose of this Viewpoint. There are various documented cases of software failures that have resulted in death, injury and loss of wealth. The most notorious case in Canada is the Therac-25, a model of radiation therapy machine that "gave a massive overdose of radiation to six cancer patients, causing severe and painful injuries, and the deaths of three patients.[7,8] A second example, less familiar to most Canadians, involved the April 1994 crash of China Airlines Airbus, killing 264 people.[9]

Even when there is no loss of life, there are countless causes of major inconvenience. Hidden among the many events and stories of the 2003 blackout is an example of a medical device designed without power-failure detection. Fortunately, this case did not involve any loss of life. The Toronto *Globe and Mail*, August 18, 2003,[10] reported the case of a woman who was having a mammogram in a Toronto hospital on August 14, 2003, the day of the blackout. Because the medical device did not have a fail-safe mechanism, the woman's breast remained trapped between two metal plates when the power failed. A nurse and the patient had to spend some time forcing the plates apart. While I could not find any written confirmation, I heard various people saying that the nurse had to remove the screws from the plates using a screwdriver.

In fact, a special issue of *Engineering Dimensions* could be filled with stories of bad software resulting in loss of life and wealth. It could also be done with electronics engineering, particularly with digital electronics. What we often call a software problem is a mix of hardware, software and human factors engineering (actually the lack of human factors engineering). In some cases, subdisciplines of electronics engineering could be involved in the protection of the public. For instance, Health Canada has issued limits and safety requirements for installation and use of radiofrequency (RF) devices that operate in the range of 3 kHz to 300 GHz.[11] Compliance with the standard is mandatory. Enforcement is supposed to occur through federal/provincial regulations in which the safety code is referenced.[12] The matter has been widely studied by the World Health Organization, which operates a wide range of activities in relation to electromagnetic fields (EMF).[13] Canada is one of 54 countries having standards in place. I believe that this is an area with the potential for an exclusive scope of practice for professional engineers.

Back in 1937, problems surrounding potentially dangerous buildings and bridges led to the enactment of the *Professional Engineers Act*. Today, the danger lies in other areas, such as malfunctioning radio link antennas and medical equipment.

Because PEO's mandate is to protect the public whenever the practice of professional engineering is involved in Ontario, PEO should, in my view, establish a committee to identify areas of practice where exclusive scopes of practice for licensed P.Engs are necessary to protect the public interest. PEO should then work with government to develop demand-side legislation covering the areas identified as requiring exclusive scopes of practice.

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Ultimately, any move to establish an exclusive scope of practice in regulation must be motivated by protection of the public. An exclusive scope of practice is essential to define a licence. Without defining an exclusive scope of practice, a licence is, at best, a mere title.

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