

A Profession for Engineers: 90 Years of Heritage

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Introduction

The heritage of our *professional status* was won by clear thinking and hard work. In this 90th year of the Institution of Engineers, Australia, we are in danger of seeing our professional heritage destroyed. It is fitting to think about what it all means, to us personally and to our collective contribution to Australia. The issue is vital for all Professional Engineers, whether members of Engineers Australia or not.

We need to view the story of the Profession of Engineering in Australia over the perspective of a century. To provide an understanding of the development, maturation and decline of the social construct of the Profession of Engineering, I present the narrative in decadal steps. The background research is presented in my book *Engineering in Australia: A Professional Ethos* (2008).

From 1919, the Institution pursued professional ideals with vigour. The Great Depression underlined the need for engineering leadership, but the prerequisite of community recognition was elusive. The Professional Engineers Award of 1961 confirmed professional status as well as providing professional reward. It also gave impetus to the clear definition of the parallel para-professional engineering occupations, and to declaration of engineering as a degree-entry profession after 1980.

Now we see a drive within Engineers Australia to redefine the 'Profession' as including para-professionals. If that occurred, our professional heritage would be destroyed. It is also useful to look a decade ahead to 2019, when the Institution could reach a Centenary, but the question has to be asked; will it survive until then?

1909: the Precursor Decade

During the second half of the 1800s the quiet pastoral life of our sparsely populated country was transformed by the tumult of gold. After 1851, gold brought people and riches, stimulating development beyond the dreams of the colonial administrators and pastoral settlers.

During 1851-1900 the development of transportation and communications placed much of engineering in the public sector. In addition, the extraction of gold gave rise to a demand for engineers for managing and equipping the mines, well developed by 1900.

The *engineering work force* comprised engineers and skilled manual workers, with upward transition to 'engineer' on the basis of 'training' and experience, and sometimes informal studies. Most civil engineers gained their professional formation by pupillage. For mechanical engineers there were links at shop-floor level through apprenticeship in the workshop followed by experience in the drawing office.

The leading engineers were exceptional in their intelligence in grappling with the challenge of developing technology. But lesser men, inducted into the practice of engineering through the haphazard informality of *experiential formation*, often became conservative and unable to progress beyond what they had learned by observation.

The number of persons recognised as Professional Engineers in Australia grew from about 50 in 1850 to 1050 in 1900. They designed and built our transport and communications infrastructure and a remarkably effective manufacturing industry mainly serving the mining industry.

By 1900 the vaguely defined occupation of an engineer remained strongly attachment to experiential formation through pupillage or the workshop, with minimal regulation by the early engineering associations. However, by then 40 percent had qualified through formal education. Federation in 1901 welded the Colonies into a unified nation, and gave impetus to a new framework of thinking.

By 1909, *a century ago*, at the end of the first Federation Decade, gold mining began to decline, but engineering was becoming more complex, as the age of steam was evolving in scale and complexity, and the electricity industry was becoming established. As our new Federal

Constitution transformed the Australian Colonies into the States of a unified nation, two factors entered the thoughts of engineers:

1. The psychology of national unification brought the idea of a forming a national engineering association out of the several State and discipline-based engineering associations, none of which were concerned with qualifications.
2. The need for adequate educational formation to underpin professional status in an engineering world of growing intellectual demand.

1919: In Search of Professional Status

By 1910 there were about 1,800 professional engineers in Australia, 50% with educational qualifications. Interest in *professionalism*, and *occupational control and identity*, began to absorb the interests of engineering leaders. As the number of engineers in Australia grew to some 2,400 in 1919, the proportion of engineers qualified from formal courses increased to about 62%.

During those Federation decades, many leading engineers, including John Monash, advocated a national Institution of Engineers, directed towards creating *a unified and qualified national profession*, with enhanced *status and identity for Professional Engineers*. Our founders had a remarkably well formulated understanding of the four criteria for recognition as a profession:

1. A substantial defined intellectual base.
2. Functions requiring exercise of that intellectual base.
3. Clear occupational identity flowing from 1 and 2, including remuneration in accordance with the reasonable needs of professional status.
4. Altruistic motivation for contribution to community good.

In February 1918 Dudley Harricks, President of the Engineering Association of NSW, called a meeting of the five NSW societies. They wanted an entirely new institution:

- (a) able to command the respect of engineers, public bodies, and the general public, both at home and abroad,
- (b) to speak with authority on questions of engineering, and
- (c) to raise, maintain, and, if necessary, defend *the professional status of engineers, both collectively and individually*.

Soon afterwards a meeting in Melbourne adopted the essential foundation criterion for professional status: *all future members would have to comply with strict membership criteria*.

The first meeting of the Council of IEAust on 20 and 21 October 1919 in Sydney marked the official foundation of the Institution of Engineers, Australia.

Membership at the end of 1920 stood at 1,858. That was 75 per cent of the Professional Engineering Labour Force, even though some engineering associations remained outside the Institution at that time.

While preserving the rights of existing members, admission to Associate Member required candidates to be at least 25 years of age, and 'trained' as an engineer. The adequacy of 'training' was in terms of passing an examination set by IEAust, or an exempting qualification from a university or a technical college. In defined the standard for engineering qualifications by the yardstick of its own examination, the Institution became a *qualifying association*, determined to influence professional engineering education throughout Australia.

Such issues occupied the new Institution in its formative years. Our first National President, Professor William Warren, identified the essential issues facing the Institution:

1. education of engineers
2. statutory registration of engineers
3. restriction of the term 'engineer' to the Profession
4. status of engineers as members of a Profession
5. ethics of professional practice.

Professor Warren articulated philosophies that imbued the first Council, and the founders who

brought about the formation of the Institution. They were clear-headed in envisioning Engineering as a Profession.

It was only after engineers resolved to achieve their societal goals through *shared affinity in their professional Institution*, that we could claim the ethos of a Profession. So, according to social theory, we have had a Profession of Engineering in Australia for 90 years, since the foundation of the Institution of Engineers, Australia, in 1919.

1929: the Professional Recognition Era

From the beginning, engineers from many quarters contributed leadership. They displayed tenacity and enlightenment in their commitment to values that were shared widely, as the *occupational identity* of the *Professional Engineer* was coupled with *membership of the Institution*.

The leaders took important roles in creating a *national professional engineering ethos*, as expressed in the development of the Institution as a qualifying association, and in the hallmarking of competence to practise. They believed their occupation to be a *profession*, that its practitioners were *professional engineers*, and that the title 'engineer' should not be usurped by others.

They strove for government protection and professional status through *statutory registration*. While the motivation included protection of the public from unqualified practitioners, it also was linked to *raising incomes*.

Had the Profession of Engineering become a registered occupation, several challenges in our subsequent history would have been avoided. Specifically, in the 1990s, the drive that arose within labour unions for competency-based recognition as an engineer, without qualifications, could not have occurred. There would have been no need, therefore, for the *protective measure* of admitting Engineering Technologists and Engineering Associates to membership. But let us return the narrative of our actual professional evolution.

But by 1929, despite strenuous efforts, Australia-wide statutory registration could not be achieved. Under the Australian Constitution, occupational recognition was a State matter, and State Governments could not be persuaded to legislate for statutory registration for Professional Engineers, except in Queensland. Success there meant little in the overall national context.

1939: The Chartered Era

In the 1930s, in the context of Economic Depression, the preoccupation of engineers with *occupational identity* turned to community recognition of engineering as a profession to rank with other occupations traditionally accorded such recognition. In 1938, Royal patronage by way of a Royal Charter added status for the Institution and access to the style *Chartered Engineer (Australia)*, but it did not contribute much materially to occupational status.

The Charter defined the Objects and Purpose, and the Powers, of the Institution, in regard to the primary purposes relating to recognition and professional status, in the following clauses:

4. The other objects and purposes of The Institution are:
 - (a) To raise the character and status and advance the interests of the **profession of engineering** and those engaged therein.
 - (b) To maintain contact and communicate with the governments of the Commonwealth of Australia and of its States and Territories and with local and municipal governing bodies and other public and private organisations on matters of concern to **engineers**, and to the **engineering profession** and to the wider community.
 - (c) To increase the confidence of the community in the employment of **engineers** by admitting to The Institution only such persons as shall have satisfied the Council of The Institution that they have an adequate knowledge of both the theory and **practice of engineering**.
 - (d) To promote honourable practice and repress malpractice and to settle disputed points of practice and to decide all questions of **professional usage** and etiquette affecting members of The Institution.
5. The Institution shall have the following powers:
 - (a) To encourage the study of engineering and to improve and elevate the general professional and technical knowledge of persons engaged or intending to engage in the **profession of engineering** and for such purposes to test by examination or otherwise the **competence** of such persons and to donate on such terms and conditions as may from time to time be

prescribed prizes or other awards or distinctions and grant certificates and institute and establish scholarships grants and other benefactions.

In those years, engineers at large began to assert that their increasing education standards and the importance of their work to the community should attract the prestige they saw accorded to other professions. However, an element of the engineering identity, inherent in the nature of the occupation, was holding them back: *engineers predominantly worked as employees rather than as independent practitioners, and largely in the public sector.*

There was a growing realisation of a need for engineers to take leadership roles on social and economic questions. But effective leadership depended upon recognition of professional status.

While engineers on the whole were poorly paid, there were a few idealists who argued that professional status depended upon professional recognition, and only then would professional status and adequate reward follow. But the status needed for leadership was elusive, and the social ideals of the 1930s faded as that path was travelled.

1949: The Key to Professional Status

By the 1940s, the realists understood that professional status depended upon a level of income commensurate with the worth of the work performed by professional engineers. Employee engineers at large began a drive to achieve a level of remuneration appropriate to professional status. With a strong commitment from engineering leaders throughout Australia, the Institution was accepted as the national body for achieving these objectives.

The great leader of the times, Brigadier Wilfrid Chapman, was supported by the leaders of the profession from all over Australia, in a Council that was of one mind in pursuit of the betterment of the profession. They looked to the Federal Conciliation and Arbitration Commission as the body through which the Institution should pursue salary levels befitting professional status.

There is no truth in the myth that the Institution did not want to engaging in the 'dirty business' of industrial relations. It was legalities that prevented the Institution from pursuing that objective: as a body of both employees and employers, the Institution could not be registered as an association of employees before the Commission.

In 1946, the leaders of the Institution fostered the formation of the new body, the *Association of Professional Engineers, Australia* (APEA), and they gave unstinting support to the quest for *status and reward* for employee engineer members. It was a long road to success.

1959: Professional Status Achieved

My personal contribution to that story began one morning late in 1958, as a young engineer at the Melbourne and Metropolitan Board of Works. I was in a deep discussion on design concepts with a colleague, Bill Wilkin, when a senior engineer came into the design office and approached us. It was Reginald Newlands, President of APEA. He told us of the work being undertaken in preparation for the national Professional Engineers Case that was about to be mounted. He enlisted our help, and we signed up.

Mr Newlands explained that the case could not be based simply upon *defining a profession on the basis of functions performed*. That had been tried in the USA in the 1950s, when the Taft Hartley Act was intended to protect the professionally qualified people by defining a profession in terms of functions performed by members. But the US courts held that if a person, *qualified or not*, could demonstrate performance of even limited professional functions, they had to be accorded professional status.

So a linchpin of our case had to be *engineering education*. Wilkin and I worked for a year in our spare time researching and writing major evidentiary submissions on the education for professional engineers throughout Australia. Our task was to prove the professional nature of such education, and also to differentiate it from *trade training*, and from the few sub-professional courses then available. We were assisted with contributions from Frank Barnes and Graham Frecker, and Michael Rice separately developed vital evidence concerning demand and supply of engineers, and on the intellectual demands of our education. Our efforts were typical of many throughout the profession at the time.

In evidence never before assembled, we proved engineering courses to be intellectually demanding and of higher level than those for other engineering workforce categories. Our evidence

was accepted and not attacked. Furthermore, we ourselves were on display as samples of the young members of the profession.

An array of witnesses from the Universities and from senior and junior ranks of the profession followed, showing how professional engineering education was applied in the conduct of professional engineering work, *establishing the value of that work*.

The case in industrial arbitration rested upon *the nature of the cognitive base of engineering and the inherent value engineering work*. The High Court of Australia and the Professional Engineers Case (1959-61) established the principle of *definition by qualification: a Professional Engineer is one who possesses a qualification recognised by the Institution, as the prerequisite for the performance of professional engineering work*.

It was an enormous privilege for me and my young colleagues, to contribute to that crucial principle that defined engineering as a profession.

1969: Professional Recognition Era

Success came with the Professional Engineers Award in June 1961. Success was achieved against the *unrelenting opposition of governments* and other interest groups. Through definitions of professional engineering work, and enhanced salary levels, the Professional Engineers Award confirmed the professional status of engineering, and conferred *quasi-legal* standing. The Award confirmed the Institution as *the custodian of professional engineering identity*. Industrial relations delivered professional recognition and salary levels. *Definition by qualification delineated professional engineering work*.

I was in the court to hear the decision. It was an experience I will never forget. It represented a passage of history never to be repeated. Two factors were crucial behind our success:

1. The Institution was accepted as the *professional body* responsible for qualifications. The profession had its educational house in order and had eliminated the last ties with pupillage.
2. Corporate membership became the hallmark for responsible practice, (but, it should be noted, it did not confer any licence to practice).

The Conciliation and Arbitration Commission provided quasi-legal substance to engineering *as a profession* on the basis of its qualifications, the importance of its work and its national character, and the *Institution was trusted as the custodian of the cognitive base of the profession*, independent of APEA as the party to the Awards.

As a result of the demonstrated unity of purpose between the Institution and APEA in pursuit of the professional and social objectives of the Profession, by 1969 the membership of the Institution represented 60 per cent of the 36,000 Professional Engineers in the Professional Engineering Labour Force, that is, engineers of working age in Australia. The Institution was serious about representing their interests, and professional Engineers supported the Institution.

Further major outcomes of the Award were: to begin the evolution towards a degree-entry profession, and definition of para-professional work and the education needed for it.

1979: Era of Educational Change

The Professional Engineers Award of 1961 brought substantial pay increases for Qualified and Experienced Engineers, identified as the *base grade* of engineering practice. Over several years that followed, further cases and negotiations dealt with the organisation and remuneration for senior engineers up to executive levels. That process created a hierarchy of definitions of professional engineering functions and pay scales commensurate with senior level responsibilities.

Sixty years following the formation of the Institution, engineering became degree-entry profession, through application of the 1980 Rule requiring a 4-year degree in engineering, or equivalent, for admission to Graduate membership. This was achieved despite opposition from Federal Government agencies. The Institution was able to assume and exercise autonomous power on behalf of the Profession, and in acting for the betterment of service to the community.

By 1980 the Profession of Engineering was in good shape. The objectives of the founders had been achieved. That is our heritage. We did it all ourselves, against the odds, on our own merits.

- Engineering was recognised as a profession, and
- Professional engineering work was well organised and well paid.

As Professional Engineers, we were able to take pride in our place in society and in the economic systems to which we contributed. *We were a Profession.*

1989: The Era of Consolidation

By 1989, the number of engineers of working age in Australia was just over 92,000, while membership of the Institution had fallen to less than 37 per cent of that number. Engineering academics and the Institution were failing to project an image of value to engineering graduates. The professional objectives having been achieved, complacency was overtaking the Profession.

Employee engineering practice was well organised. There was no ambiguity as to professional occupational identity, and well-designed educational provisions were in place for the para-professional occupations of the engineering work force.

At that time, any idea of combining professional engineers and engineering technical officers and drafting officers within a 'profession of engineering' would have been treated as a sick joke, perpetrated by people having no grasp of the path travelled by the *Profession of Engineering* in the previous 40 years.

1999: The Era of Social Change

The achievement of a well-recognised professional status came with change in attitudes to collective representation. When everyone has a degree denoting professional status, sight is lost of a need for a qualifying association. Today, *well-paid* engineers consider that an engineering degree and a good *curriculum vitae* do not need an added *hallmark* of Institution membership. The Institution now is confined to functions that most engineers ignore: learned society functions, accrediting degree courses and hallmarking for Chartered status. By 1999, out of a Professional Engineering Labour Force of some 138,000 engineers of working age in Australia, only 38,000, or 28 per cent, were members of the Institution. In the absence of any overt action to promote and defend the occupational identity and professional status, Professional Engineers at large saw no value in membership.

The ideal of *collective representation* came under additional pressure in the era of economic rationalism, *individualism* and *competition*. In the evolution of social change, first came **de-engineering**, as exemplified in local government: the well-known engineering identity of the **Shire Engineer** was transformed into 'manager of technical services', implying that engineering was a secondary feature and that a professional engineer was not necessarily required.

Towards the end of the 1980s, the major engineering employers were the public works departments, electricity commissions, roads and water authorities, and similar public sector engineering organisations. However, all soon were dismantled or reduced to shadows. Even as early 1990, a notable feature was the large number of engineers self-described as sole practitioner consultants, the results of public-sector 'reform', as outcomes of 'downsizing', 'outplacement' and early retirement.

Another politically correct ideology also arose. In the early 1990s the Institution had to combat the metals unions and the Commonwealth Public Service against a doctrine of *irrelevance of education* to occupational competence. In response we took control of the *educational and competency definition* of the Professional Engineers, Engineering Technologists and Engineering Associates, by creating carefully defined Institution membership grades. We defeated the competency ideology. *We protected the professional identity of engineers.*

By the end of the 1990s, even in the new circumstances of social change, the Profession of Engineering was in as good a shape as it could be. But then the white ants began to gnaw.

2009: The Era of Denial

A new factor arose in the 1990s: a restructuring of the leadership of the Institution according to the ideology of business: the Council was reduced from a widely representative body to a small number, who soon forgot that the *core 'business'* the Institution remained as promotion and protection of the interests of professional engineers.

By 1999 corporate amnesia overtook the Institution. The new assault on professional identity came from within, with an attempt to include para-professionals within a debased 'profession of engineering'.

In 2005 our forgetful leaders became *intent upon a redefinition of the Profession of Engineering as including technical officers, the para-professionals with 2-year TAFE diplomas, the academic equivalent of about one year of degree studies.*

They were forestalled by the vote of Corporate Members, but their intentions remain. The present leaders of the Institution are prepared to flout the will of members, as it was clearly expressed in 2005, and they ignore the Charter of the Institution.

How is it possible to support the idea that a person with a 2-year TAFE diploma could be a member of the Profession of Engineering? The proposition is ludicrous.

By 2009, out of a Professional Engineering Labour Force of some 189,000 engineers of working age in Australia, just under 38,000, or 20 per cent, are members of the Institution. The remaining 4 out of 5 Professional Engineers at large see no value in membership. If the intended debasement of the 'Profession' succeeds, and engineers at large realise that their professional status has been undermined by the Institution, their indifference is likely to be replaced by hostility.

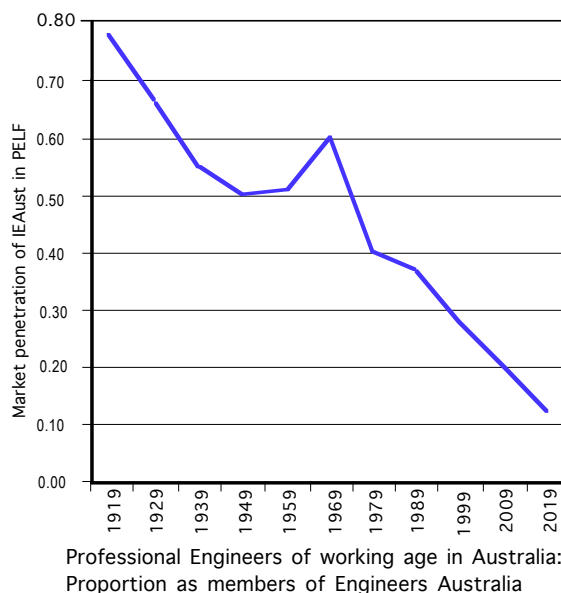
2019: Centenary Possibilities

By 2019, marking the centenary Engineers Australia, there will be a Professional Engineering Labour Force of about 240,000 Professional Engineers of working age in Australia, can we envision the condition of the Profession of Engineering? We could foresee two possibilities, one pessimistic and another optimistic.

The first possibility is a projection from present trends: indifference to a primary responsibility for promoting and protecting the interests and status of Professional Engineers, an egalitarian ethos within a widened definition of 'Profession' to include para-professionals, technologists and perhaps other vaguely-related occupations, and a diminishing membership in which Professional Engineers in 2019 might number about 30,000, or one in eight of the Professional Engineering Labour Force. Such a body could hardly cling to the name 'Institution of Engineers, Australia' or 'Engineers Australia'. In fact, it would be fraudulent to do so, in that it would present the confusing image of para-professionals being 'engineers'. In this consideration, the changed body could hardly claim retention of incorporation under the Royal Charter, which clearly defines the Profession of Engineering as comprising Professional Engineers. A new means of incorporation would be needed: perhaps as 'Some Technology Australia'!

If all that were to eventuate, APESMA and ACEA, as the bodies having primary concerns for professional status and recognition, would need to assume dominant control over the National Professional Engineers Register, and primary responsibility for occupational definition, educational accreditation and certification of Professional Engineers for areas of practice. The Institution would be irrelevant.

But can we envision a positive future? It will require a re-commitment to the primary reason for the formation, and the existence, of Engineers Australia, that is, to further the professional



interests of Professional Engineers, and to provide and protect their professional identity, in accordance with the Royal Charter. All other functions of Engineers Australia must be pursued within that framework: ethics, learned society functions, ideals for community service, acknowledgement of the value of related occupational groups, and the rest. There would need to be full and equal cooperation with APESMA and ACEA in management and control of the National Professional Engineers Register, to ensure continuing validity of occupational definition, educational standards and accreditation, and certification of Professional Engineers for areas of practice.

In this model, there would be no place for other occupations within Engineers Australia. It would require a return to the original concepts of 1993: an independent Society of Engineering Technologists Australia, and an independent Society for Engineering Associates Australia, each linked to the respective registers: the National Engineering Technologists Register and the National Engineering Associates Register.

For these occupations, matters concerning criteria for occupational definition, educational accreditation and certification of Engineering Technologists and Engineering Associates would have to be subject to overall coordination of an Engineering Council, with dominant control by Engineers Australia, APESMA and ACEA acting together.

With such a model, and with concerted efforts by the professional engineering bodies in projecting the primary objective of promoting and protecting the interests of Professional Engineers in serving the community, it is possible by 2019 to envisage the membership of Engineers Australia as 200,000 Professional Engineers of working age in Australia.

Which of these future possibilities is preferable?

Conclusion

Engineering heritage normally has been viewed in terms of material artefacts. In noting the 90 years of our **Professional Engineering heritage**, we celebrate a social construct held in common by all our kindred professions: in law, architecture, medicine, and the like.

But after 90 years, the leadership of Engineers Australia has lapsed into a state of professional unconsciousness. Our leaders fail to understand the difference between a **Profession** and a **Team**.

1. The **Engineering Team** is the collective of three distinct occupations of Professional Engineer, Engineering Technologist and Engineering Associate. I agree with that.
2. The **Profession of Engineering** is the body of Professional Engineers. It would be debased by redefining the 'profession' as including technical officers, the para-professionals.

I have been astounded that many engineers at large cannot see the difference between Team and Profession. The staff of Engineers Australia, and the editorial staff of *EA Magazine*, treat Team and Profession as synonymous.

But our *professional* heritage was created by the *vision* and the *efforts* of many: especially our first President, Professor Warren, and Past-President Wilfred Chapman who we celebrate annually in the Chapman Oration, and Reginald Newlands, whose leadership of APEA brought us the heritage of a *well-paid professional status*.

Our professional heritage rests also upon the contributions of the past Councillors of the APEA and Institution, the engineers with whom I served from 1960 to 1994.

Our professional heritage too rests upon the unstinting contributions of many other engineers throughout the 20th Century, including Bill Wilkin and Michael Rice and the many other witnesses in the Professional Engineers Case.

I am proud of the contributions I have made to my profession over a lifetime. So you will understand my dismay to see a serious proposal for para-professional people to be counted as members of the *Profession* of Engineering

When we see such views espoused by our current leaders, we are witnessing *rejection* of the 90 years of *professional heritage*. In their view, what we created was a waste of time.

Unless the Institution can regain its primary purpose, in representing and protecting the *professional status* of Professional Engineers, it has no relevant future.

In this, our 90th year, if engineers at large no longer see value in *a clear professional identity*, and no value in the *interdependence* denoted by membership of their professional Institution, the *professional ethos* is *dissipated* among *isolated individuals*. We no longer have a Profession.

Can we hope for a resurgence of professional consciousness before our centenary?

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