Professional Performance, Innovation and Risk (PPIR) for Engineers

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ABSTRACT

The Australian engineering profession has established standards for competency and ethics, but lacks the necessary third element, a definition of the standard of performance that engineering professionals should expect of themselves and each other. This issue has been addressed in the Professional Performance Innovation and Risk (PPIR^{TM}) project undertaken by the Warren Centre for Advanced Engineering, which considered the role of the engineering professional and the performance, innovation and risk management aspects; expectations of the community and clients; contemporary commercial and professional realities impacting the work of the engineering professional; complexities of law and liability; engineering risk and responsible risk-taking; and the relationships between professional performance, innovation and risk.

The work by the Warren Centre resulted in the publication of the 2009 Report "Professional Performance, Innovation and Risk in Australian Engineering Practice" which included the PPIR Protocol^{TM}, which defines the expected performance for engineering professionals.

A new project team has been established to manage the roll-out of the PPIR protocol within the Australian engineering profession and industry. Key objectives of this phase are to disseminate the PPIR Report, provide education and training and have the engineering industry and profession adopt the Protocol. This phase of the work is being sponsored by a number of engineering and contracting companies, public and private sector operators and representatives from the legal and insurance industries. The work is also supported by a wide range of professional associations.

The new approach will have a direct bearing on the professional performance of geotechnical engineers in Australia.

Keywords: professional, performance, innovation, risk

1. INTRODUCTION

The theme of this conference is on the changes in the environment in which we, as engineers, are working, in particular in the perceptions and awareness of our key stakeholders, which include the community, our clients, our employers and our colleagues. There is now an increased expectation from these stakeholders that there will always be a perfect outcome to any engineering activity and if this doesn't occur, it is the fault of the engineer.

As geotechnical engineers, we must successfully deal with significant uncertainty, many unknowns and potential risks in providing advice and services to our clients that meet the expectations of all of their stakeholders. Consider site investigation services, one of the basics of geotechnical engineering. The ICE Ground Board (1991) concluded that "in civil engineering and building projects, the largest element of technical and financial risk lies normally in the ground". Ground related factors provide a common source of delays, claims and increases in construction costs (ICE 2001). Any dispute over these issues is fundamentally due to the differing expectations of the parties. This in turn is due to the lack of clarity on what is expected in terms of performance of a professional engineer. To achieve the clarity on what is the expected level of professional performance includes not only excellent technical skills, but also scope definition, risk management, task management and importantly, the management of the relationships with all stakeholders. It is also apparent that the responsibility for ensuring this performance lies not just with project managers or company management, but with each professional engineer involved in delivering an engineering task.

These issues were at the heart of the a project undertaken under the auspices of The Warren Centre for Advanced Engineering within the University of Sydney (The Warren Centre) by a project team of leading engineering professionals, backed by participating sponsors representative of a wide range of engineering industry and professions under the title of Professional Performance, Innovation and Risk Project (PPIR Project). The team worked over a four (4) year period involving extensive workshops and consultations with over 200 practising professional engineers from all engineering disciplines.

2. THE PPIR PROJECT

2.1 Defining Professional Performance

The PPIR project explored and considered the generic role of the professional engineer and in particular:

- the performance, innovation and risk management aspects of the role
- community and client expectations of the engineering profession
- the contemporary commercial and professional realities impacting on the work of the engineering professional
- the effects of complex laws and liability issues that govern everyday engineering
- engineering risk and responsible risk-taking
- the relationships between professional performance, innovation and risk.

The project team's investigations highlighted the fact that, although the engineering profession has long had standards to define and assess the competency and ethics of a professional engineer, the profession has lacked any clear basis to define and assess their performance. As shown in Figure 1, the aim of the PPIR Project is to address this shortfall and provide a performance standard as the third component to complement the existing competency and ethics standards.

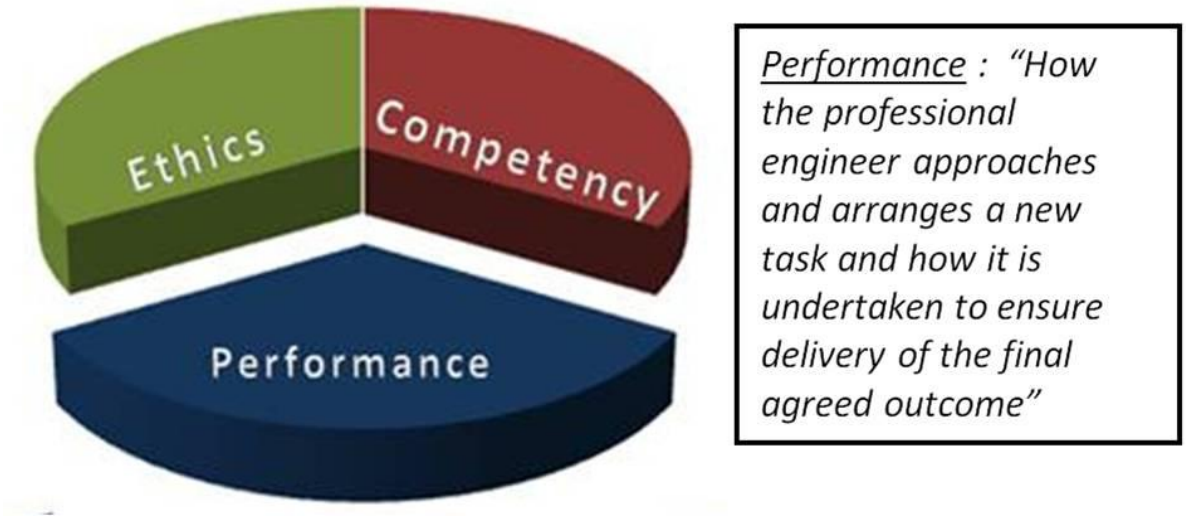

Figure 1: Performance; The third element of engineering professionalism

2.2 The PPIR Protocol™

From the findings of the project, in November 2009 the team published the "Professional Performance Innovation and Risk in Australian Engineering Practice" (PPIR) Report. The report includes a number of recommendations, the most important of which is for the adoption by the Australian engineering industry and profession of the PPIR Protocol™

The PPIR Protocol™ defines an expected level of professional performance for engineers and provides a checklist of key aspects for undertaking an engineering task that professional engineers should address, including competency to perform the task, risk, management and a process for undertaking innovation.

The key features of the PPIR Protocol™ are:

- to inform and guide the professional engineer acting individually or as a member of a team on the essentials of performance in undertaking an engineering task
- to inform and guide all parties to, and stakeholders in, an engineering task on the role and obligations of the professional engineer and the effective use of professional engineering services
- to define the essentials of performance against which the 'duty and standard of care is measured'.

As shown in Figure 2, the Protocol consists of eight (8) elements with which a professional engineer should comply, covering the areas of:

- Relevant Parties and Other Stakeholders
- The Engineering Task
- Competence to Act
- Statutory Requirements and Public Interest
- Risk Management
- Engineering Innovation
- Engineering Task Management
- Contractual Framework

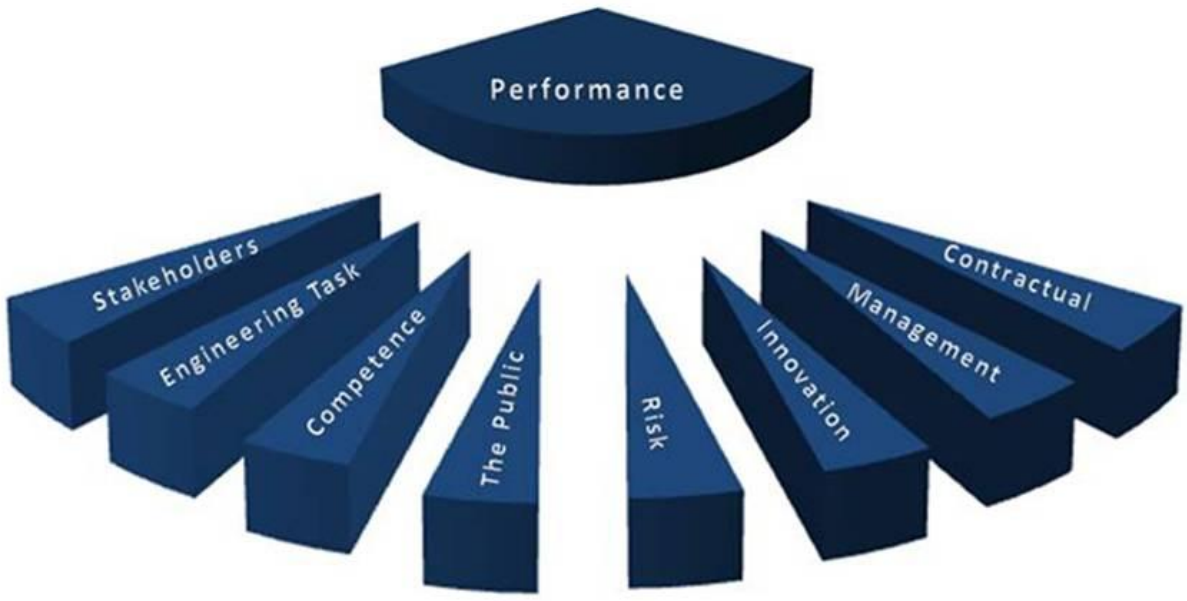

Figure 2: The eight elements of the PPIR Protocol™

2.3 Implementing the PPIR Protocol™

Following the publication of the PPIR Report, a second project team was established to implement the report's key recommendations, with the key aim of achieving the adoption of the PPIR Protocol by the engineering profession and industry in Australia. To change the approach and expectations of parties associated with the engineering industry is a considerable challenge but also of a huge importance if the community at large is to fully recognise the value of the profession.

For the second project, five (5) teams have been established to undertake this phase of the project which commenced in mid-2010 and is expected to continue to 2013.

- The Communications team is responsible for disseminating information on the project, through briefings to key stakeholders, seminars, conference participation and via the project's website and the Implementing PPIR LinkedIn group.
- The Education & Training team's focus is on training professional engineers in the application of the PPIR Protocol as well as working with tertiary institutions on the incorporation of PPIR in course curricula.
- The Industry Adoption team has developed information packs to assist organisations with ensuring that their business processes are adapted where necessary to allow unfettered use of the Protocol by professional engineers.
- The Standards team is involved in the development of a standard as the equivalent of the PPIR Protocol™ for application by corporate entities.
- The Liability team is developing an approach to controlling risk and professional liability as part of the PPIR Project.

This last topic, the liability and risk approach of the PPIR Project, is explored below.

3. PPIR IN A CHANGING RISK ENVIRONMENT

3.1 Risk

Most engineering organisations recognise risks associated with their business and have implemented processes to address these risks. Many are aware of Standards and guidelines such as AS/NZS ISO 31000. In many cases however, the way in which risk management is implemented falls well short of best practice, for example:

- Organisations may view risk management as the responsibility of the project manager or senior management. Instead, as the PPIR Protocol stresses, management of risk is the responsibility of everyone within an engineering organisation.
- Many organisations focus on segmenting the risk and where possible, passing it to another party. In contrast, PPIR calls for "a formal, fully integrated, transparent approach to recognising and delineating all the risks and accountabilities in each engineering task, in a way that creates and promotes a shared understanding of a 'best for risk management' approach".

The risk management elements in the PPIR Protocol are based on informing and guiding the engineer and all stakeholders in relation to the engineer's role. They address the essentials of risk management as applicable to the engineering task, facilitate communication between the interested parties through a common vocabulary and organise the risk management activities in the most efficient manner. Importantly, the guidelines include the use of a structure based on key elements of the engineering task to facilitate risk assessment within the allocated accountabilities.

3.2 Liability

The other side of the risk issue is the resultant potential liability for professional engineers and engineering organisations. Without a proper definition of an expected level of professional performance, as applied in other professions such as medicine and the law, assessment of performance is often made on the basis of "were the stakeholders happy with the end result". And where a dispute goes to court, again in the absence of a clear definition of expected performance, judgments are often strongly influenced by the retrospective wisdom of "expert witnesses". This situation has created significant problems for the engineering industry and for the insurance industry from whom they seek Professional Indemnity insurance.

The key liability and insurance challenges currently facing the Australian engineering profession are:

- Establishing benchmark standards for the professional performance, and assessment of performance, of engineers.
- Establishing a system for the accreditation of engineers as expert witnesses and the acceptance of accredited experts in the legal and dispute resolution spaces.

Managing the exposure of engineers to legal liability arising from the provision of their professional services is a central focus of the profession, the public, the legal system and the professional indemnity insurers of engineers.

Engineers and affiliated professions would benefit enormously from better prescription of the touchstones of benchmark engineering practice, which the PPIR Protocol delivers.

National adoption of PPIR would give:

- Engineers' certainty about the standards of practice against which their professional conduct and that of their peers, will be assessed.
- The legal system a professional performance framework for the assessment of the legal liability of engineers and the resolution of disputes which involve them, by reference to the opinions of accredited expert engineers and to the Protocol.
- The insurance industry greater comfort about the management of risk and assessment of liability in the engineering and legal professions, making engineering risks more attractive to insurers and reducing the cost of professional indemnity insurance for engineers.

3.3 Meeting Community Expectations

The PPIR Protocol™ provides a clear framework to define engineering performance and to ensure all stakeholder expectations are understood and met. The authors of the PPIR Report found that there was often a lack of alignment in expectations between the engineering service provider and the receiver of those services. Using the PPIR Protocol™, performance expectations and risks are worked through and aligned from the outset, significantly reducing the likelihood of problems occurring later on down the track and dramatically reducing the impact of any problems that do arise.

Regarding the public interest, the PPIR Protocol™ states that the professional engineer "should identify and respond to relevant statutory requirements and public interest issues" and address "ways in which these issues may impact upon or change the definition of the Engineering Task".

More broadly, the Protocol has the potential to achieve public benefit by providing:

- a more balanced, cost-effective working relationship between client and supplier in both the public and private sectors, leading to better outcomes and value for money, particularly in major projects
- more application of engineering innovation, including in the area of sustainability
- more balance in environmental and other public interest issues
- fewer commercial disputes, better dispute resolution outcomes, less litigation
- better use of scarce engineering industry and professional resources.

3.4 The Path Forward

The project enjoys the support and participation of a range of major professional associations, representing the profession (for example Engineers Australia), the consulting profession (Consult Australia), the employees (APESMA) as well as many others. Due to the broad application of PPIR at every level from employee to major corporation, there is no single association which is able to take the project forward by itself, which explains the ongoing role of The Warren Centre, in essence a 'pointy end think tank' providing an ongoing driving and coordinating role together with the respective associations. A series of major seminars on PPIR is being run in major Australian centres, with the active support of the key associations.

Other more focused sessions are being held for special interest and technical discipline based groups. This provides the opportunity to explore issues and applications of PPIR which are most relevant to specific engineering applications, such as Ground and/or Environmental Engineering.

The PPIR project has also been enthusiastically supported by a group of 18 sponsor organisations, many of which, including Golder Associates, are actively developing plans to adopt the PPIR Protocol™ within their Australian engineering organisation and many more organisations are expected to follow during 2012 and 2013. These roll-outs are being supported by the respective PPIR teams as follows:

- The Education and Training team provides training programs on the PPIR Protocol™, tailored for the needs of individual organisations as well as training of project teams and train the trainer sessions
- The Industry Adoption team provides a PPIR adoption pack and advice to engineering organisations on how PPIR can best be incorporated into their existing business processes and embedded in the day to operation of the engineering teams.

In addition, a scheme of ratification will be in place which recognises that an organisation has incorporated the PPIR Protocol in their business processes and authorises them to use a logo specifying this on their literature and letterheads.

Beyond the roll-out of the PPIR Protocol, the next target will be the development and adoption across the engineering industry of a corporate equivalent of the PPIR Protocol, which will be available as a template for establishing high performance teams between suppliers and users of engineering services.

4. CONCLUSION

The PPIR Protocol is recommended to the Geotechnical professional community in Australia and New Zealand as a vital component for the development, promotion and recognition of the value of the profession in the 21st century.

5. ACKNOWLEDGMENTS

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