Editorial

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Predicting the future is never easy. While a trend may be discernable, past performance, as the financial analysts say, is no guarantee of future results. This is, of course, pleasing, because there are many negative trends which we need to correct, such as our seeming inability to wean ourselves off non-sustainable sources of food, energy and materials. Thankfully, it is in our human nature to be inventive, and new discoveries, and the creation of new tools and processes, frequently allows us to solve some of the problems we face. Of course technology has also made us richer in terms of material wealth and spare time, and this creates its own problems of ever increasing consumption.

A critical question that we have to answer as a profession concerns our readiness and ability to solve problems in a timely fashion as they become apparent to us. On the one hand, a ready-made answer to the question of skills needs to solve future problems revolves around a need for basic understanding of engineering science and an ability to engage in the design process, which takes an open-ended problem and creatively provides a range of solutions, with each in its own way nearing the optimum. The authors of the papers presented in this themed issue on the future skills needs for municipal engineers, however, have gone well beyond this obvious understanding and propose a range of interesting theses concerning the range of skills they perceive are required.

In the first paper Bather (2011) presents some interesting findings from a survey of full- and part-time undergraduate civil engineering students which affirms a model of learning where universities and industry need to partner closely in order to ensure that essential theory and current practice are introduced to developing engineers in appropriate measures. The findings suggest that students, perhaps more than their more senior work colleagues, understand the need for continuous learning and development. Interestingly, Bather hints that perhaps more effort should be expended by the institutions on promoting and accrediting continuous professional development as opposed to the accreditation of degrees.

Mills (2011) provides an interesting view on the position of engineering education within the context of post-modernism, a philosophy which the author suggests acknowledges a lack of sufficiency of knowledge, a greater cynicism and uncertainty, and a fragmentation of established systems. After an analysis that compares and contrasts stages and facets of societal

change against clearly identifiable equivalences in engineering education, the paper goes on to make some interesting recommendations about the nature of engineering education, and further suggests that current professional and accreditation body guidance is post-modernist in nature because of its suggestions that engineers should act holistically within society, and not act just from a technical standpoint.

Continuing the theme of holism, Cross (2011) suggests engineers require highly honed skills in communication with stakeholders, particularly non-technical members of the public who may be affected by schemes. Using the example of contaminated land, the author suggests that putting across concepts about risk, which are very much to do with probabilities of occurrence, requires a very careful balance between over-simplification and being too complex. Overall, the paper suggests, the engineer needs to recognise the need to build up the trust of stakeholders.

Taking a slightly different non-technical subject, Cooper and Ashurst (2011) note that the municipal engineer has developed from a person used to designing works into someone who has to produce contract documentation for procuring design services – a difficult transition. In addition to the well recognised design skills, a municipal engineer needs to have excellent awareness of law and public administration, financial knowledge and, very importantly, negotiation skills. In addition, the changing environment means that additional knowledge and skills are required in flooding and carbon dioxide reduction.

Management is also the subject matter for Emuze and Smallwood (2011), who identify paucity in capacity and competence at procurement and maintenance of infrastructure as being a reason for the lack of success in engineering schemes in a specific developing world context which they investigated. A lack of intellectual capital due to high staff turnover and loss of experienced staff means that there is less ability to make decisions and manage contractors and consultants appropriately. The paper suggests that strategies need to improve remuneration, professional status and respect.

The papers by Sansom and Coates (2011), and Reed *et al.* (2011) come full circle back to Bather's point about continuous professional development and expound on appropriate subject matter and methods. Sansom and Coates describe an interesting

method where key staff are exposed to successful methods of managing (in their case study, a water supply) and which is then followed up by a scheme of mentorship which allows for the planning and making of suitable changes to the way that their business is managed. Reed evaluated the dialogue between universities supplying engineers and the demands of their employers, which revealed areas for improved education and training in management, human resource development and engagement.

To avoid falling into Mills' trap of merely being modern rather than post-modern, it is perhaps not appropriate to suggest, in summary, that the emphasis of all the papers is on non-technical aspects of engineering, as opposed to the technical aspects. The point that perhaps we come away with is that, in the context of civil engineering, and municipal engineering in particular, our activities and skills need to be wide ranging if we are ever successfully to deliver engineering artefacts and processes suitable for the communities we serve.

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