CERC Hearings Monday 10 September 2012

Dr Andrew Cleland

- 12 years as IPENZ Chief Executive following 23 years as an engineering academic.
- Held role of Programme Director(Technology and Engineering) at Massey University – equivalent to Dean of Engineering at University of Canterbury
- Professor of Food Engineering with specialisation in refrigeration engineering

Perspective:

- Original lead drafter of the CPEng Rules and thus familiar with how they work as a collective set of Rules, including competence standard, assessment methods, Code of Ethics, complaints process etc.
- Long term (since 2001) NZ representative to International Engineering Alliance so familiar with international practice and benchmarking, also one of lead group preparing international exemplar competence standard 2001-2007
- Familiar with outcomes-based assessment and re-assessment processes

1. Regulation

- Approximately 20,000 self-declared professional engineers in 2006 Census, but possibly 40,000 degree holders in NZ (c.f. 3000 CPEng, 6000 MIPENZ or FIPENZ)
- Regulated activities – OSH, construction, transport vehicles
- CPEng is a business enabling quality mark of current competence, MIPENZ is a quality mark of professional standing (over 50% CPEng and greater proportion of MIPENZ have no interaction with Building Act)
- Culture of graduates aspiring to pass competence assessment to achieve both/either has been strengthened in engineering schools
- Number of engineers in active professional practice in which MIPENZ and CPEng might be advantageous could be > 10,000
- Benchmarking of NZ competence standard required by CPEng Act, supported by APEC Engineer and EMF agreements – collectively involve 20 countries
- Competence exemplar of the International Engineering Alliance (IEA) derived from NZ standard – uses the construct of a self-defined practice area.
- NZ last reviewed by IEA in 2006 – due for review again in 2013
- Two constructs for assessment (competence = informed doing):
    - Assessment based on work samples with corroboration from referees, interactive assessment, supplemented by controlled written assignment
    - Assessment by simulation (examination) – standardised assessment
- Examination most helpful when knowledge level required is greater than highest academic qualification of the candidate;
- Examination requires scale of operation so used in large countries
- New Zealand only member of IEA to re-assess competence as well as check reasonable steps to maintain knowledge and skills (CPD)
- 2009 internal review of assessment process led to changes
    - Greater use of interactive assessment
    - Encouragement to use controlled written assignment for design tasks
    - Publication of candidates names seeking input
    - Creation of senior assessor group for training and moderation
- CPEng is an entry level competence – much commercial building structural work is above the entry level.

Review of Health Practitioners Competence Assurance Act 2003;

- Discussion paper issued 31 August 2012 (http://www.healthworkforce.govt.nz)
- Ensuring occupational regulation supports multi-disciplinarity and teamwork
- Practitioners being required to work across blurred boundaries

- Need for support of practitioners to be linked to occupational regulation

2. Recognising Specialist Skills

Practice Fields (% of all CPEng)

Structural	18%
Geotechnical	4%
Fire	1%
Building Services	3%
Management and Civil	7%
Management and Structural	2%
Civil and Structural	10%
Management and Geotechnical	0%
Management and Fire	0%
Management and Building Services	0%
Civil	33%

Practice Area Examples

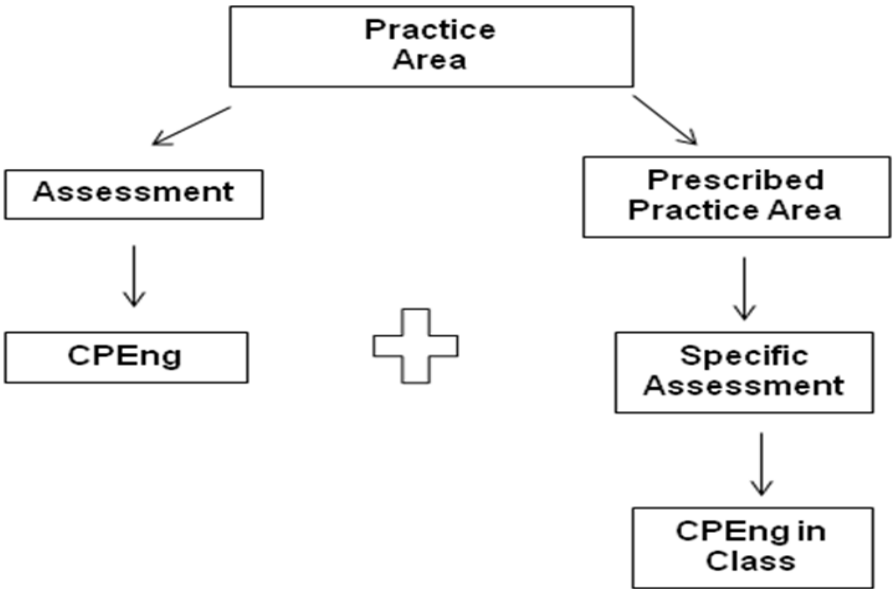
Design building structures - Institutional, commercial, residential/domestic; Concrete/ steel/timber/blockwork; Design civil works - surface water drainage, road and carpark geometry and landscaping, retaining walls and like; Advice and design - construction engineering elements: Temporary support, falsework, construction sequence and methodology, underpinning, shoring, crane bases etc

Design, management of design process and construction monitoring of building and civil structures; Earthquake resistant structural engineering; Design of building foundations.

Structural Design of domestic, industrial and commercial buildings; Project management of civil engineering and building projects; Design of civil engineering works, including subdivisional works, retaining structures, landfills, services and drainage; Compliance review of building consent documentation.

Structural Engineering: Design and construction of buildings, wharves, tanks and bridges in reinforced concrete, steel, reinforced masonry and timber; Assessment of existing buildings constructed in reinforced concrete, steel, reinforced masonry,

unreinforced masonry, and timber. Civil Engineering: Design and construction of retaining walls; Assessment of seismic hazard.



- New Zealand assesses about 300 candidates annually
- Practice area construct is most practicable approach for small nation
- Classes of CPEng are a suitable construct for specific tasks with health and safety focus:
    - Recognised engineer (dam safety)
    - Design verifier (OSH)
    - E.g. Damaged building assessment
    - E.g. Strengthening method design
    - But probably not “Structural” – too broad
- “CPEng Plus” could be introduced for very complex commercial structural work – a higher level assessment, may use different balance of assessment tools e.g. examination (as there may be sufficient volume)
- Fourth level occasionally recognised internationally above the three international benchmarks:
    - Engineering technician (CertETn, RegEngAssoc in NZ)
    - Engineering technologist (ETPract in NZ)
    - Professional engineer (CPEng in NZ)
    - Higher level normally in narrow areas of practice
- Costs controllable as long as class assessment done at same time as regular continued registration assessment
- Are perverse effects of CPEng Plus better or worse than reliance on self-certification of level of competence relative to task?

3. Code of Ethics

We see the code of ethics as being a moral code setting a requirement beyond that in law/regulation

43 Take reasonable steps to safeguard health and safety
A chartered professional engineer must, in the course of his or her engineering activities, take reasonable steps to safeguard the health and safety of people.

48 Inform others of consequences of not following advice
(1) A chartered professional engineer who considers that there is a risk of significant consequences in not accepting his or her professional advice must take reasonable steps to inform persons who do not accept that advice of those significant consequences.
(2) In this rule, **significant consequences** means consequences that involve—
(a) significant adverse effects on the health or safety of people; or
(b) significant damage to property; or
(c) significant damage to the environment.

50 Not disclose confidential information
(1) A chartered professional engineer must not disclose confidential information of an employer or client without the agreement of the employer or client.
(2) Subclause (1) does not apply if—
(a) the failure to disclose information would place the health or safety of people at significant and immediate risk; or
(b) the engineer is required by law to disclose that information.

53 Not review other engineers' work without taking reasonable steps to inform them and investigate
(1) A chartered professional engineer who reviews another professional engineer's work for the purpose of commenting on that work must take reasonable steps to—
(a) inform that engineer of the proposed review before starting it; and
(b) investigate the matters concerned before commenting.
(2) Subclause (1) does not apply if taking those steps would result in there being a significant and immediate risk of harm to the health or safety of people, damage to property, or damage to the environment.

- Minimum standards in IPENZ and CPEng codes identical – latter has power of regulation

- Some good practice sharing on codes of ethics within IEA (mandatory for CPEng code to consider international good practice)
- Issues of concern we intend to address:
    - The nature of disclosure required under Rule 43 to meet the reasonable steps criterion (education or an amplified Rule)
    - The nature of the obligation on registrants to report poor quality practice by another engineer to a relevant regulator (negligence, incompetence, ethical breach)
    - Concerns raised by new knowledge – the engineer who wonders whether a design done using previous conventional wisdom is adequate – what are "reasonable steps" in this circumstance?
    - The obligations on engineers observing others operating outside their competence level.

46 Not misrepresent competence

A chartered professional engineer must—

(a) not misrepresent his or her competence; and

(b) undertake engineering activities only within his or her competence; and

(c) not knowingly permit engineers whose work he or she is responsible for to breach paragraph (a) or paragraph (b).

- Mandatory reporting by BCAs/engineers may prove to be a regulatory matter
- Boundary definition of competence would be assisted by classes and practice areas, but not by field information which is too coarse.

4. Complaints and Disciplinary Process

- Balance needed: open culture to disclose mistakes vs disciplinary action at bottom of cliff: tiered approach to poor practice
    - Education and counseling
    - Early call-in for reassessment
    - Disciplinary process
- Education already undertaken for engineers to see using these tools as a professional obligation – needs repetition (e.g. 2003 Engineering Dimesnion)
- Punitive approach can drive poor behaviour underground, and discourage complaints, increasing risk of tragic mistakes
- Insurers often limit reporting of incompetence or negligence by other engineers
- Peer reviewer role can conflict – providing objective comment to improve design thereby assisting engineer vs acting as reporting agent
- BCA in a neutral role in terms of occupational regulation - providing information can be blameless for them

5. Training

- Outcomes based standard allows for variable means of preparation for assessment – suitable approach considering
    - the diversity of engineering,
    - diverse private sector employment (c.f. State employment or subsidy in medicine)
    - the significant role of immigration in morphing our engineering workforce
    - the difficulty of achieving scale to use structured approaches (such as exams) for cohorts with similar needs in a small nation
- Outcomes-based assessment does not preclude a structured programme in a field/area of practice if there is sufficient volume
- Large employers have programmes that work effectively
- Many smaller employers also excellent if an “old hand” provides mentoring
- Assessment at the end of CPD activities lifts value of the learning but rarely occurs
- Short course programmes with assessment could be tailored for entry to specific classes of CPEng – pass the assessment and be a currently competent CPEng to enter the class e.g. emergency building assessment
- CPD of both soft and technical skill development is important – both are provided

6. Engineering Education

- Lifting NZ above Washington Accord standard could be contemplated as a key economic driver towards a high technology nation
- But the higher costs might diminish student participation
- 4.25 year programme seems appropriate
- BEngTech (Civil) graduates may be under-utilised for simpler structural and geotechnical work e.g. simpler residential housing (thereby releasing BER(Hons0 graduates to complex work)
- Civil programmes could have “minors” as well as the Civil major – Environmental, Structural – signals to the employment market e.g. BE(Hons) (Civil – Structural)
- Candidates with overseas qualifications assessed via a knowledge assessment process
    - Sharing of information through IEA members
    - Evaluation by a trained engineering educator
- Process looks at “civil” content and may not be specific to structural.
- In competence assessment of structural candidates the local knowledge element focuses on seismic engineering
- In the “design” element candidates need to provide evidence of sound structural design to NZ codes and standards

7. Professional and Learned Societies

- Community of shared competence between architecture and structural engineering apparently stronger in other countries – combined registration/assessment bodies

- Innovation and new knowledge always leads regulation. Hence there is generally a staged approach
    - First use – quality controlled by peer review
    - Emergence of collegial agreement – guidance notes
    - Practice community acceptance – code of practice
    - External validation - voluntary standard
    - Incorporation in regulation – regulatory standard
- All are valid – an adverse test result could lead to an immediate need to provide advice to discontinue a previously accepted method – guidance note issued immediately (and regulators may not be able to respond quickly enough)

- Key success factor is ensuring both user acceptance and regulatory suitability of any code/standard

- Disciplinary process would consider whether engineer took into account all regulations, standards, codes and guidance material available at time of engineering work. i.e. the professional standard set might be higher than regulation if non-regulatory advice was circulating in practice community