Engineering Education into the Future:

Changing the Culture

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Engineers Australia
Content

- Changing the Culture
- The Current State
- Accreditation
- Engineering into the Future
- Engineering Education
Changing the Culture: 1996

- Academy of Technological Sciences and Engineering
- Engineers Australia
- Australian Council of Engineering Deans
- DEETYA
Conclusions

• Emphasis on Engineering Science
  – Excellent technical capability
  – Limited appreciation of the broader role of engineering professionals
  – Engineering must become more outward looking
  – Attuned to community concerns
Recommendations

• Engineering Education must promote
  – Environmental, economic and global awareness
  – Problem solving
  – Application of information technology
  – Self directed and lifelong learning
  – Management and teamwork skills
  – Communication

• Mathematical and Engineering Skills
• Goal of a more Effective Societal Role
• Not Only Explain Technical solutions
• But Also
  – Politically and Socially aware
  – Sound technical decision-making
  – Clearly communicated
  – Sensitivity across cultural boundaries
Structure of Engineering Education

• Amalgamation may be necessary but not at the cost of diversity between and within Engineering Schools
• More Engineering Students are needed
• And better prepared!
Collaboration with Industry

- Research
- Liaison Committees
  - Advice on course direction and content
- Internships
- Engineering Experience to academic staff
- Student experience of professional working environment
Professional Development

Stage 1
Competency Assessment

Student
- Accredited Program

Graduate Member

Member

Fellow

> 3 years professional experience

Major Responsibility and Contribution

Chartered Status Path

Stage 2 Competency Assessment

Professional Formation

Chartered Status NPER Registration

NPER Registration
Approaches to Accreditation

Fully Prescriptive
- Program structure
- Program content
- Assessment
- Operating environment
- Quality process

Outcomes Assessed
Direct measurement of graduate capabilities as per Stage 1 competency assessment

Engineers Australia Approach
- Defined generic outcome requirements
- Defined accreditation criteria
- Guidelines and expectations
Expected Engineering Attributes

- Understand the real goals of the community
- Identify and communicate mechanisms to attain these goals
- Provide objective and reliable advice on life-cycle costs and benefits of each mechanism
- Persuade the authority that the benefits justify the investment!
- Mobilise the required human, financial and physical resources
More Expected Engineering Attributes

• Create and maintain a well-trained and motivated project or program team
• Ensure that all relevant factors are included in the implementation process
• Design, develop, construct, test, evaluate, and record the necessary systems
• Ensure that these systems can be successfully operated and maintained
Other Trends in Engineering

- Closer design, lower cost
- Less maintenance, more replacement
  - Life cycle design
- Quantitative, white collar profession
- More women
- Increased standard of graduates
- Engineering team leaders
- Opportunity overload
Employment Trends in Engineering

- Job security by ability and experience
  - Not single employer
  - More consultants
  - More money for engineers
  - Faster promotion
  - Seduction to management
  - Wider horizons
  - Globalisation, more travel
  - Greater personal fulfillment
More Trends in the Engineering Environment

- Failure of traditional disciplines
- Teams
- New roles for engineering institutions
- Leaders of society
- To manage our complex technology
- To maintain social and ethical values
Aging of the Profession

Age Distribution by Year, Total Membership

Number of Members

Age Distribution by Year, Total Membership

Age Categories

<20 21<30 31<40 41<50 51<60 61<70 70>

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Aging of the Profession
Engineering Career Stages
Whole of Life Learning
The Changing Profession of Engineering

• Engineering is changing
  – From an occupation that supplied employers and clients with competent and economical technological advice
  – To a profession that seeks to serve the community in a socially and environmentally responsible manner