



How Engineers Become CEOs

Mr Steven Goh (Lecturer in Mechanical Engineering, USQ)

Professor Frank Bullen

Pro Vice-Chancellor (Research) and Dean (Faculty of Engineering & Surveying)

Capt Warren Coaker (DMO, Australian Defence Force)

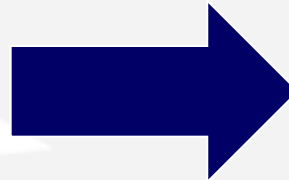
About USQ & the Faculty



- **Approx 25,000 Students**
- **A leader in Distance & Online Learning**
- **3 Campuses in Queensland, Australia**
- **Flexibly structured nationally accredited courses**
- **A member of the “OpenCourseWare” Initiative**
- **A full suite of Engineering & Spatial Science courses**
- **Industry Partnerships**
 - **Industry focused courses**
 - **Focused applied research teams**
 - **Outcome orientation**



The Engineer



The CEO

Questions?

- Educational development required for transition from Engineers to Managers?
- Confirmation of attributes needed for effective engineering management?
- Operating environment in the future for engineering managers?
- Implications for aspiring Engineering Managers?
- Implications for Educators?

Background

- “2020 Vision Report: The Manager of the 21st Century” in 2006
 - Hinged on the “Karpin Report” released in 1995
 - Commissioned by Innovation & Business Skills Australia and compiled by Boston Consulting Group
- To identify the attributes needed for future managers to manage effectively in the year 2020
- A review of current development in managerial training and the change in trends of workplace’s demographics
- Surveyed the top CEOs and Managing Directors in Australia who have a recognised engineering degree
- An initial investigation requiring further quantitative work

Summary of Report Findings

Changes in the operating environment and workplace will need CEOs who are:

- Global & mobile
- Culturally aware
- Strong technical acumen
- Strong interpersonal skills & high EQ
- Team leadership (less individualised leadership)
- Encountering complex issues
- Increased number of diverse stakeholders
- Hard to find work/life balance
- Life-long learning habits

Survey Background



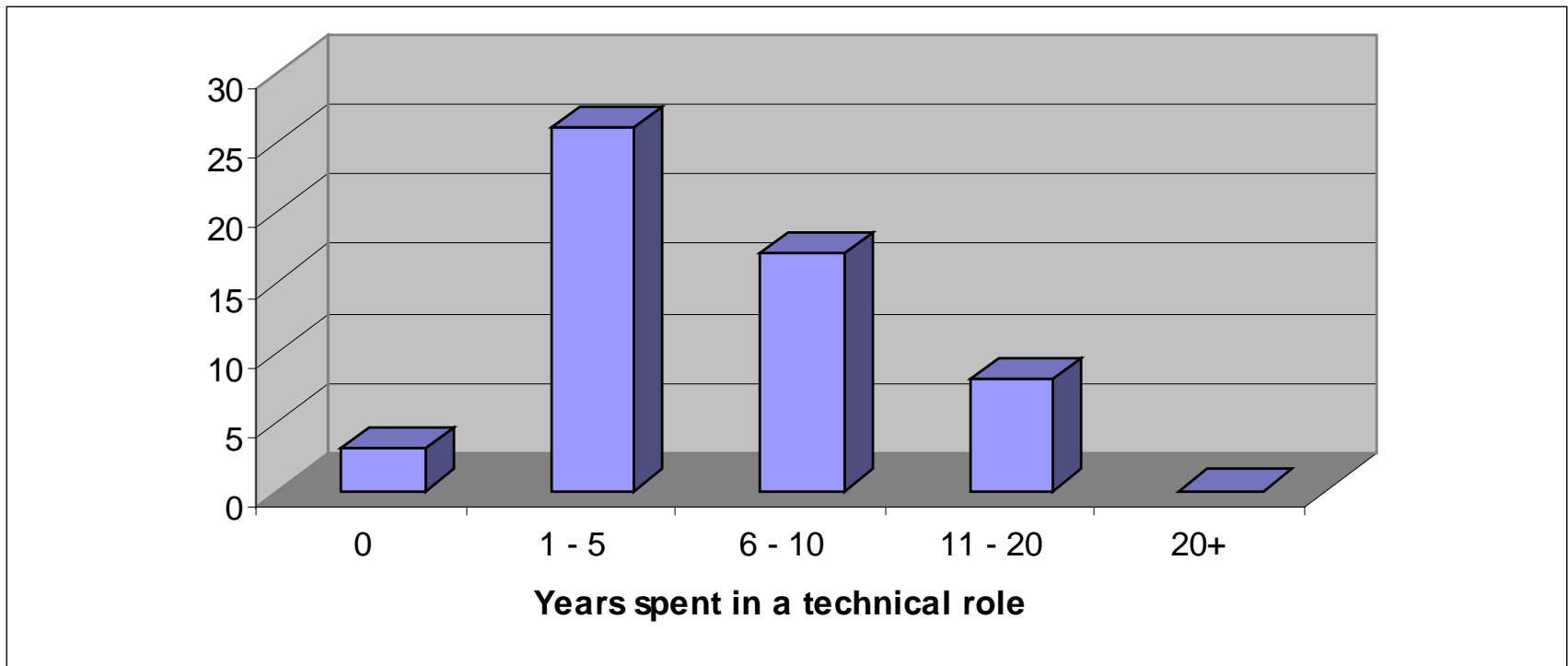
- CEOs perceived as a business or finance related profession
- Limited research into suitability of engineers as senior managers
- Some engineers highly successful at senior management levels

Survey Distribution

	Sent	Received	Response Rate
Emails	163	13	8%
Regular Mail	352	69	20%
Total	515	82	16%

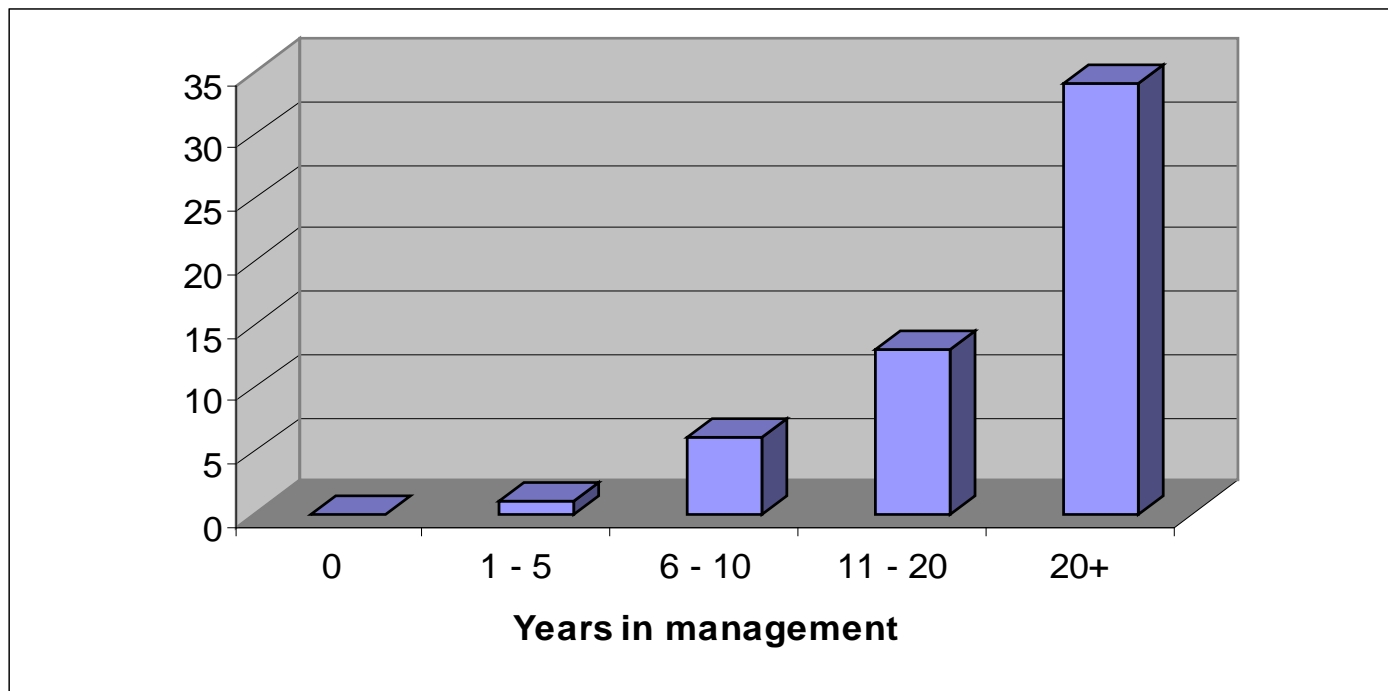
Survey Findings

Average time spent in technical role = 6 years



Survey Findings

Average time spent in management role = 22 years



- Natural career progression ~59%
- Actively sought management ~24%
- Avoiding technical roles ~4%

Engineer / CEO Qualifications

ENGINEERING
SURVEYING

Higher Management Degree	48%
Higher Technical Degree	20%
Management Diploma	24%
Technical Diploma	7%
PhD	7%
Nil	15%

- Top five in order of importance:
 - Integrity (9.50)
 - Leadership (9.07)
 - Interpersonal skills (8.91)
 - Communication ability (8.88)
 - Drive / ambition (8.84)

- Top five (with training requirement):
 - Leadership
 - Communication ability
 - Business Acumen
 - Strategic Planning
 - Financial Management

Engineer / CEO Training



■ During University study:

Accounting skills	35.7%
Analytical / reasoning skills	32.5%
Economics	32.5%
Financial management	30.4%
Project management	26.1%

Engineer / CEO Training

- In a technical role:

Communication skills	59.1%
Administration	56.1%
Further technical skills	56.1%
Analytical / reasoning skills	47.5%
Project management	41.3%

- In junior management roles:

Legal awareness	59.2%
Leadership	46.7%
Strategic planning	33.3%
Financial management	32.6%
Project management	30.4%

- In mid-management roles:

Leadership	20.0%
Strategic planning	27.1%
Legal awareness	18.4%
Business acumen	16.3%
Change management	15.9%

- In senior management roles:

Leadership	4.4%
Strategic planning	4.2%
Legal awareness	4.1%
Change management	4.5%
Business acumen	2.3%

- Professional Skills vs Technical/Management Skills
- Strategic thinking becomes important as career progresses
- Engineering training is found to be a good basis for management, but...

Implications for Engineers

- Awareness of career options
- Technical skills are still important at senior levels
- Financial and Legal skills introduced earlier
- Masters qualifications and continuous professional development
- Continually develop communication and leadership skills formally and informally

Implications for Educators

ENGINEERING
SURVEYING

USQ
AUSTRALIA

- Financial and Legal skills to start in undergraduate and reinforce in postgraduate
- Technical, Management and Leadership training should be combined into a new Master qualification
- Highly customized and flexible delivery postgraduate courses in Engineering Management
- Team-related and Communication skills incorporated into technical courses at all levels

Conclusion



- Professional skills critically important
- Leadership, Communication, Financial, and Problem Solving skills
- Perform effectively at all levels
- Straddle between disciplines and professions
- Customization and Flexibility

Salient Remarks for Aspiring CEOs

- Have a Career plan
- Do not rush promotion, be recognised on your merit
- Sound technical acumen is still important
- Develop leadership through life experiences, and broaden your horizons
- Learn to think and plan strategically
- Develop strong professional skills
- Further studies but be specific and strategic



Engineering Management Education Post GFC and Copenhagen: Are We on the Right Track?

- Current Status
- Future Trends
- Post Global Financial Crisis (2008)
- Post Copenhagen UN Climate Change Conference (2009)
- Future actions

- 20th Century model in the 21st Century
- Business faculties active in transformation
- Dynamic and complex environments
- Opportunities for engineering educators
- Postgraduate engineering management
- Future actions need to be taken

Future Trends

ENGINEERING
SURVEYING

USQ
AUSTRALIA

- Ability to nurture and lead an adaptive workforce
- Ability to manage diversity and multiple stakeholders
- Genuine social and ethical attributes
- Strong emotional intelligence
- Strong intelligence leadership
- Strong leadership in sustainability
- Confidence in presence and abilities
- Strong business and commercial acumens
- An in-depth knowledge of one's industry

Key Attributes

- Most attributes haven't changed
- Post GFC and Copenhagen, more emphasis on
 - Agility
 - Integrity

Actions - In Brief



- A new engineering management postgraduate program
- Recognized and accredited formal qualification
- Develop 21st century skills and attributes
- Seek to progress graduates towards Chartered status (Professional Status)
- Catering for both aspiring frontline and middle managers
- Onus on individuals rather than organizations
- Complements existing programs

Drivers & Challenges

ENGINEERING
SURVEYING

USQ
AUSTRALIA

- Engineering Management Recognition
- Chartered Status & Registration
- Engineering Leadership
- Engineering Sustainability
- Globalisation of the Engineering
- Complexity of the Engineering
- Engineering graduate mobility

Proposed Format

ENGINEERING
SURVEYING

USQ
AUSTRALIA

- Distance, residential, work-integrated learning environments
- Recognition of other prior learning including articulation pathways
- **Personal, professional and educational development**
- Life-long learning journey approach
- Multi-disciplinary and cross-disciplinary cohort
- Internationalised cohort
- Mentored via industry and academia
- EA endorsed professional educators

Proposed Components



- Career episode reporting
- Work integrated courses
- Core introductory courses
- Research-based project
- Philanthropic flavoured project
- Personalised learning contracts
- Leadership coaching
- ...etc

- Collaborative approach
- Identify stakeholders to be involved
- Steering committee or reference group
- EA input into the development
- Identify issues to be addressed
- Propose actions to move forward
- Full feasibility study and business case to follow



Engineering Management Education Post GFC and Copenhagen: Are We on the Right Track?

**Yes, somewhat, but needs more
emphasis on Agility and Integrity**

Steven Goh (co-author Prof Frank Bullen)

Engineer Accountant Restaurateur Academic Politician?