How Engineers Become CEOs

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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
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

  - 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

<table>
<thead>
<tr>
<th></th>
<th>Sent</th>
<th>Received</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emails</td>
<td>163</td>
<td>13</td>
<td>8%</td>
</tr>
<tr>
<td>Regular Mail</td>
<td>352</td>
<td>69</td>
<td>20%</td>
</tr>
<tr>
<td>Total</td>
<td>515</td>
<td>82</td>
<td>16%</td>
</tr>
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</table>
Survey Findings

Average time spent in technical role = 6 years
Survey Findings

Average time spent in management role = 22 years
Motivation

- Natural career progression ~59%
- Actively sought management ~24%
- Avoiding technical roles ~4%
## Engineer / CEO Qualifications

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Management Degree</td>
<td>48%</td>
</tr>
<tr>
<td>Higher Technical Degree</td>
<td>20%</td>
</tr>
<tr>
<td>Management Diploma</td>
<td>24%</td>
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<tr>
<td>Technical Diploma</td>
<td>7%</td>
</tr>
<tr>
<td>PhD</td>
<td>7%</td>
</tr>
<tr>
<td>Nil</td>
<td>15%</td>
</tr>
</tbody>
</table>
Engineer / CEO Attributes

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

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

During University study:

<table>
<thead>
<tr>
<th>Skills</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting skills</td>
<td>35.7%</td>
</tr>
<tr>
<td>Analytical / reasoning skills</td>
<td>32.5%</td>
</tr>
<tr>
<td>Economics</td>
<td>32.5%</td>
</tr>
<tr>
<td>Financial management</td>
<td>30.4%</td>
</tr>
<tr>
<td>Project management</td>
<td>26.1%</td>
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</tbody>
</table>
In a technical role:

<table>
<thead>
<tr>
<th>Skill</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication skills</td>
<td>59.1%</td>
</tr>
<tr>
<td>Administration</td>
<td>56.1%</td>
</tr>
<tr>
<td>Further technical skills</td>
<td>56.1%</td>
</tr>
<tr>
<td>Analytical / reasoning skills</td>
<td>47.5%</td>
</tr>
<tr>
<td>Project management</td>
<td>41.3%</td>
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</tbody>
</table>
Engineer / CEO Training

- In junior management roles:

<table>
<thead>
<tr>
<th>Skill</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Legal awareness</td>
<td>59.2%</td>
</tr>
<tr>
<td>Leadership</td>
<td>46.7%</td>
</tr>
<tr>
<td>Strategic planning</td>
<td>33.3%</td>
</tr>
<tr>
<td>Financial management</td>
<td>32.6%</td>
</tr>
<tr>
<td>Project management</td>
<td>30.4%</td>
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</tbody>
</table>
Engineer / CEO Training

- In mid-management roles:

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<tbody>
<tr>
<td>Leadership</td>
<td>20.0%</td>
</tr>
<tr>
<td>Strategic planning</td>
<td>27.1%</td>
</tr>
<tr>
<td>Legal awareness</td>
<td>18.4%</td>
</tr>
<tr>
<td>Business acumen</td>
<td>16.3%</td>
</tr>
<tr>
<td>Change management</td>
<td>15.9%</td>
</tr>
</tbody>
</table>
## Engineer / CEO Training

- In senior management roles:

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>4.4%</td>
</tr>
<tr>
<td>Strategic planning</td>
<td>4.2%</td>
</tr>
<tr>
<td>Legal awareness</td>
<td>4.1%</td>
</tr>
<tr>
<td>Change management</td>
<td>4.5%</td>
</tr>
<tr>
<td>Business acumen</td>
<td>2.3%</td>
</tr>
</tbody>
</table>
Other Findings

- 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

- 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?
Purpose

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

- 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

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

- 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
Engagement

- 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?