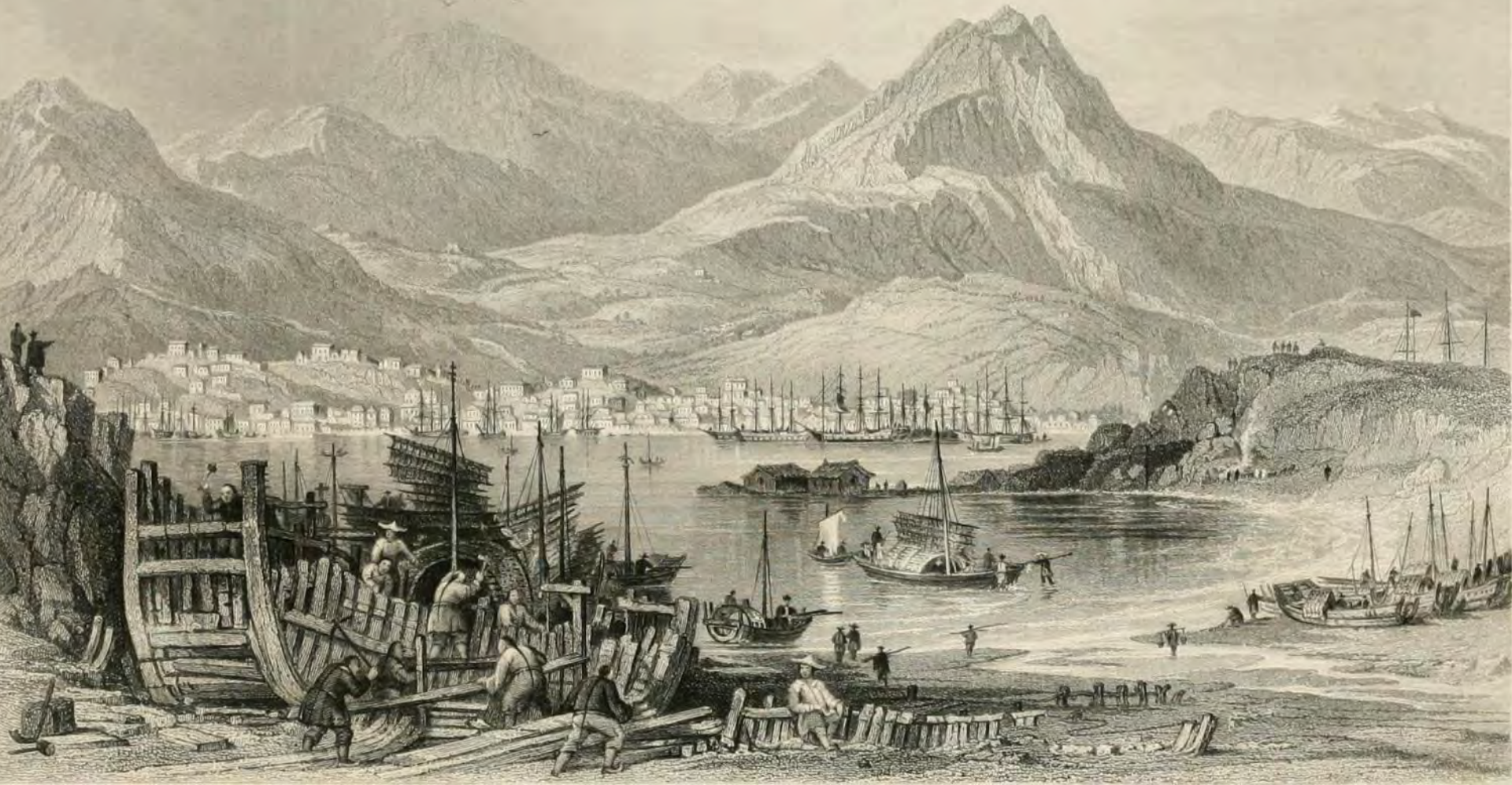


Impacts of Engineering Education – Past, Present & Future

Ir Thomas CHAN Kwok Cheung
President, The Hong Kong Institution of Engineers

IMPACTS OF ENGINEERING EDUCATION OVER THE YEARS





Military & naval construction

A black and white aerial photograph of Hong Kong, showing a dense urban landscape with numerous buildings, roads, and green spaces. The city is situated on a peninsula, with a large body of water visible in the background. The text "Roads, reservoirs & housing" is overlaid on the right side of the image.

Roads, reservoirs & housing



Airport & Tsing Ma Bridge



Hong Kong-Zhuhai-Macau Bridge

Guangdong-Hong Kong-Macau Bay Area



engineering education

**driving
engineering talent**

**driving
economic success**

Engineering education past



Engineering education now



The HKIE Disciplines



Building Services Engineering

Civil Engineering

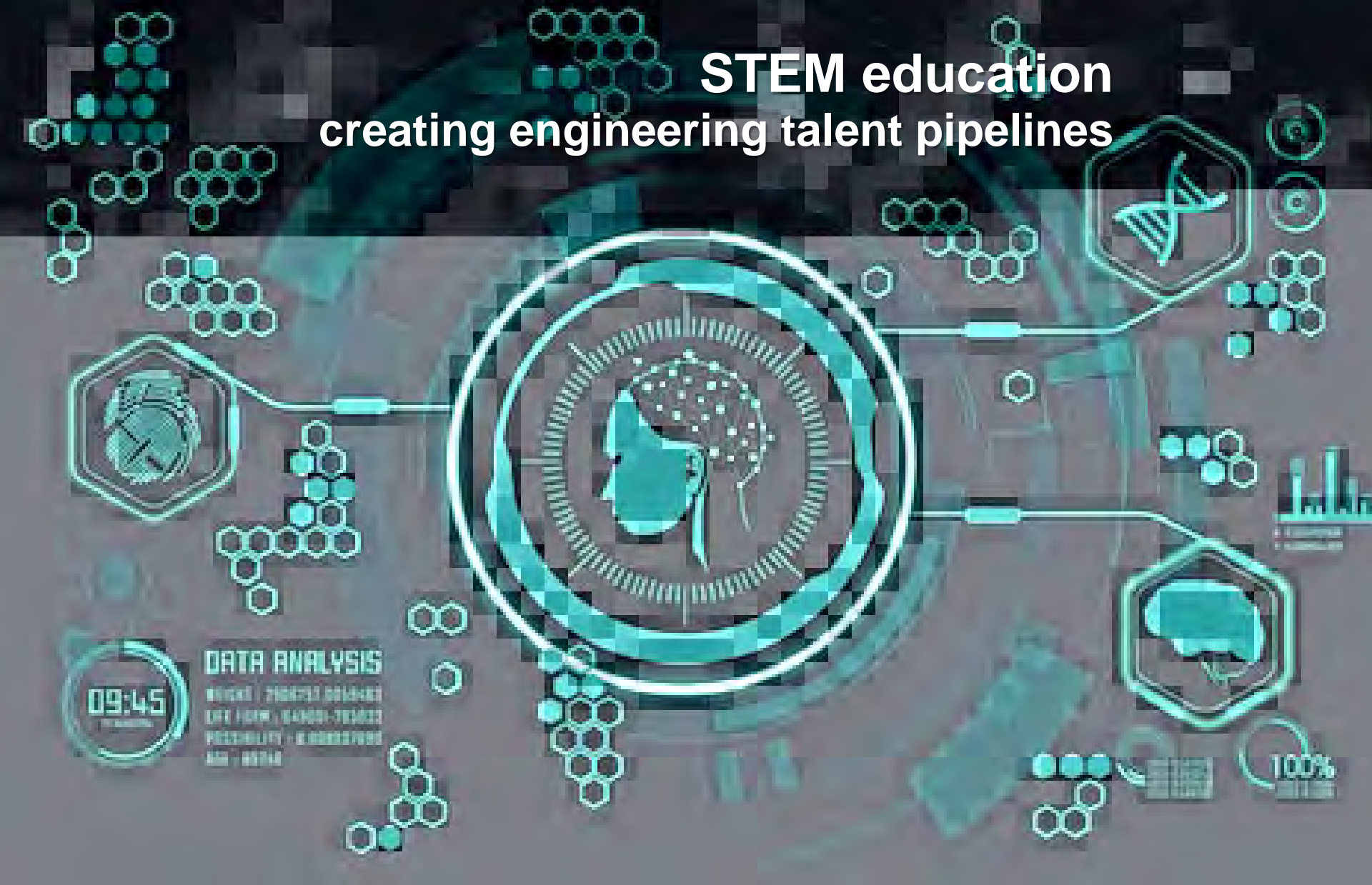
Environmental Engineering & Mgt.

Education adapting with industry

- Product Analysis & Engineering Design
- Enterprise Engineering & Management
- Electronic Commerce & Internet Computing
- Technology & Management



STEM education creating engineering talent pipelines





THE HONG KONG INSTITUTION OF ENGINEERS

香港工程師學會



Outcomes-based accreditation





International benchmarking



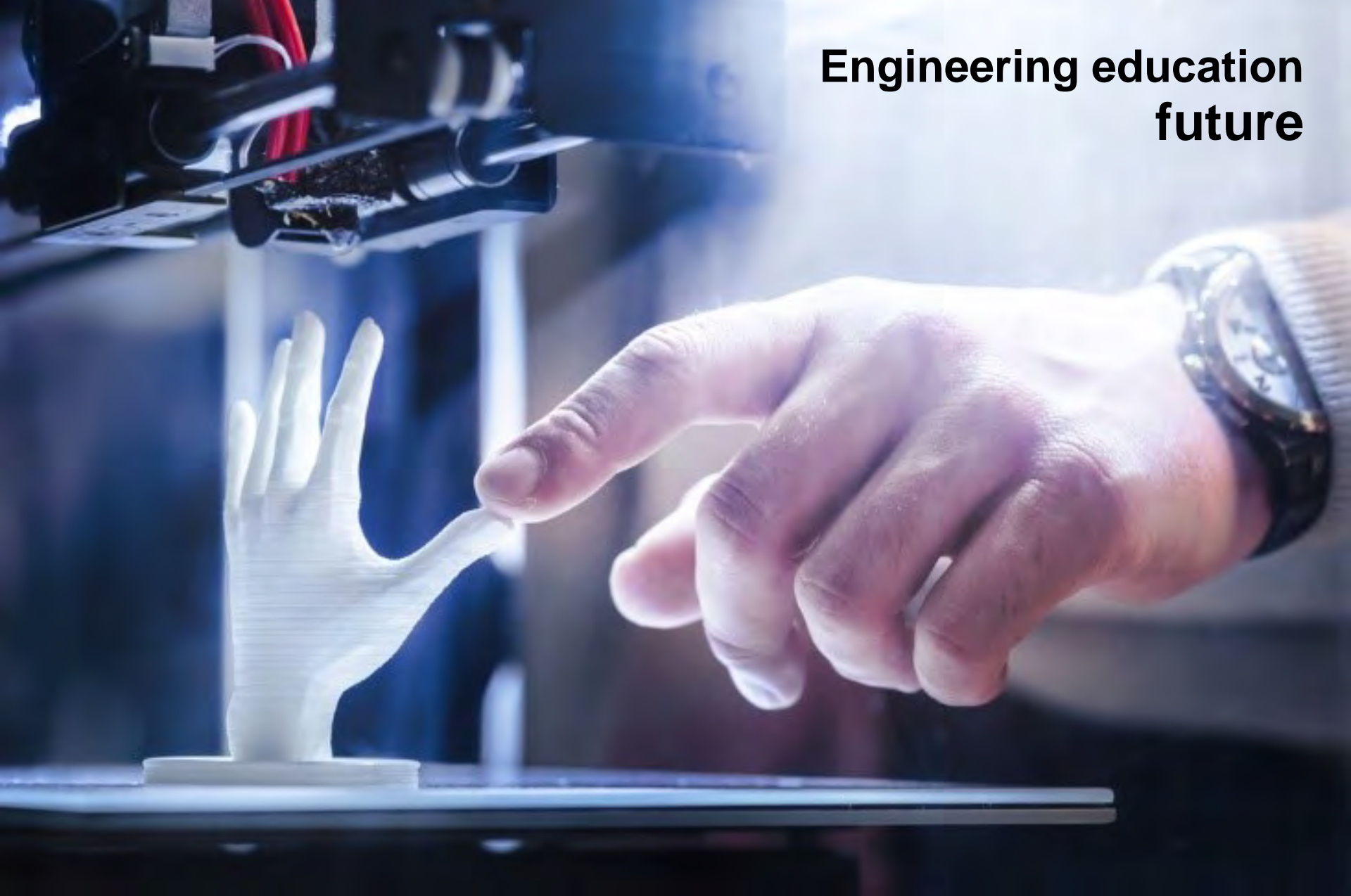
Bridging education and industry



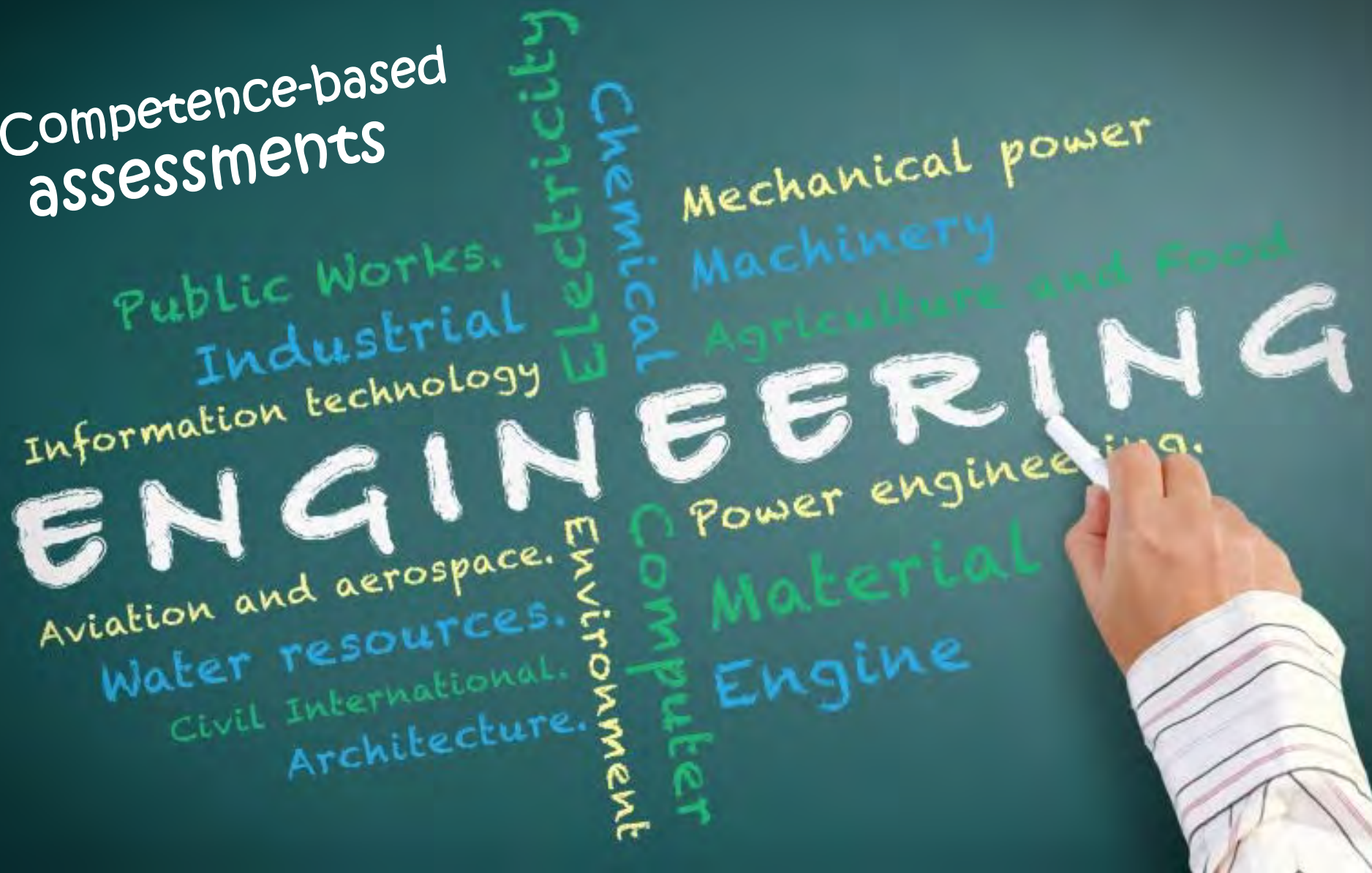
Discipline matching
...even harder than dating



Engineering education future



Competence-based assessments

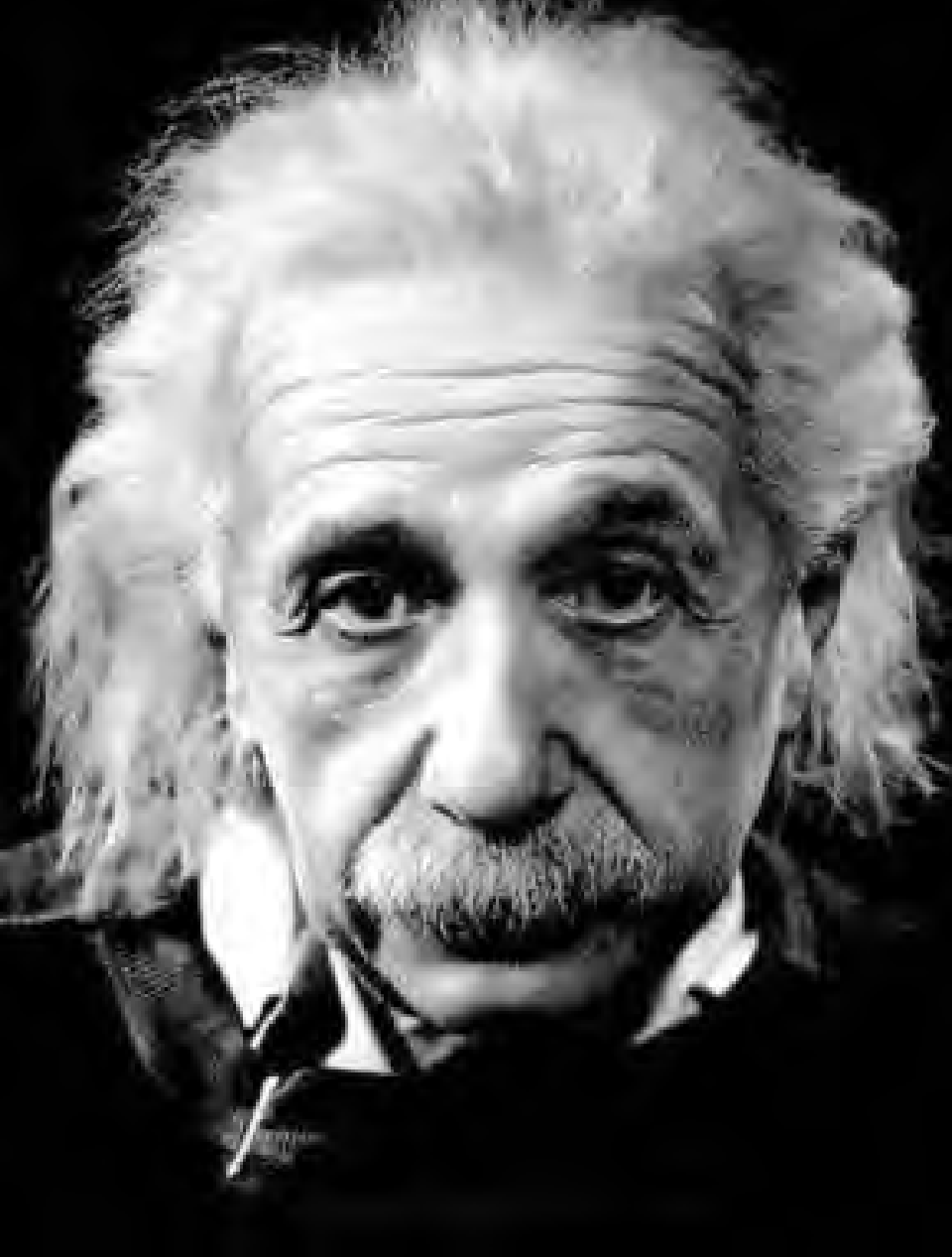




Looking ahead



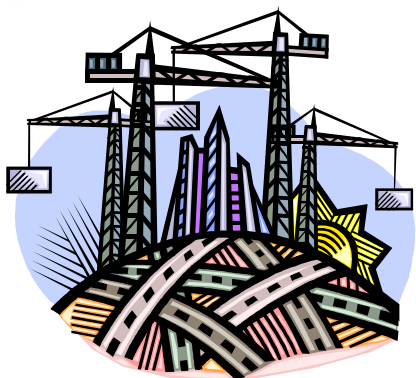
$$6 + 4 = 10$$



"Once you stop
learning, you
start dying"

~ Albert Einstein ~

$\sin \alpha = \pm \sqrt{\frac{1 - \cos \alpha}{2}}$
 $\cos \alpha + \sin \alpha = \sqrt{2} \cos(45^\circ - \alpha) = \sqrt{2} \sin(45^\circ + \alpha)$
 $\cos \alpha - \sin \alpha = \sqrt{2} \sin(45^\circ - \alpha) = \sqrt{2} \cos(45^\circ + \alpha)$
 $(1+x)^m = 1 + mx + \frac{m(m-1)x^2}{2!} + \frac{m(m-1)(m-2)x^3}{3!} + \dots + \frac{m(m-1)(m-2)\dots(m-k+1)x^k}{k!}$
 $= 1 + \sum_{k=1}^{\infty} \binom{m}{k} x^k, |x| < 1$
 $\sin \beta = \frac{1}{2} [\cos(\alpha - \beta) - \cos(\alpha + \beta)]$
 $\cos \beta = \frac{1}{2} [\cos(\alpha - \beta) + \cos(\alpha + \beta)]$
 $\sin \beta = \frac{1}{2} [\sin(\alpha - \beta) + \sin(\alpha + \beta)]$
 $\cos \beta = \frac{1}{2} [\sin(\alpha - \beta) - \sin(\alpha + \beta)]$
 $V = lwh$
 $S.A. = 2lw + 2lh + 2wh$
 $\frac{1}{1-x} = 1 + x + x^2 + \dots + x^n + \dots = \sum_{n=0}^{\infty} x^n, |x| < 1$
 $\frac{1}{1+x} = 1 - x + x^2 - \dots + (-x)^n + \dots = \sum_{n=0}^{\infty} (-1)^n x^n, |x| < 1$
 $\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$
 $\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$
 $\tan 2\alpha = \frac{\tan^2 \alpha - 1}{2 \tan \alpha}$
 $\tan^2 \alpha - \tan^2 \beta = \frac{\sin(\alpha + \beta) \sin(\alpha - \beta)}{\cos^2 \alpha \cos^2 \beta}$
 $\tan^2 \alpha - \sin^2 \alpha = \tan^2 \alpha \sin^2 \alpha$
 $\tan^2 \alpha - \cos^2 \alpha = \tan^2 \alpha \cos^2 \alpha$
 $1 \pm \tan \alpha \tan \beta = \frac{\cos(\alpha \pm \beta)}{\cos \alpha \cos \beta}$
 $\tan \alpha \tan \beta \pm 1 = \frac{\cos(\alpha \pm \beta)}{\sin \alpha \sin \beta}$
 $A = qa(a+2b)/2L$
 $B = qa/2L$
 $T_1 = A, T_2 = -B$
 $x = A/q$
 $m = B/b$
 $SA = LA + 2B$
 $\sin(-\alpha) = -\sin \alpha$
 $\tan(-\alpha) = -\tan \alpha$
 $\sin(\frac{\pi}{2} \pm \alpha) = \cos \alpha$
 $\tan(\frac{\pi}{2} \pm \alpha) = \mp \cot \alpha$
 $\sin \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{2}}$
 $\cos \frac{\alpha}{2} = \pm \sqrt{\frac{1 + \cos \alpha}{2}}$
 $\tan \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{1 + \cos \alpha}} = \frac{\sin \alpha}{1 + \cos \alpha} = \frac{1 - \cos \alpha}{\sin \alpha}$
 $\cot \frac{\alpha}{2} = \pm \sqrt{\frac{1 + \cos \alpha}{1 - \cos \alpha}} = \frac{\sin \alpha}{1 - \cos \alpha} = \frac{1 + \cos \alpha}{\sin \alpha}$
 $\sin^2 \frac{\alpha}{2} = \frac{1 - \cos \alpha}{2}$
 $\cos^2 \frac{\alpha}{2} = \frac{1 + \cos \alpha}{2}$
 $\tan^2 \frac{\alpha}{2} = \frac{1 - \cos \alpha}{1 + \cos \alpha}$
 $\cot^2 \frac{\alpha}{2} = \frac{1 + \cos \alpha}{1 - \cos \alpha}$
 $e^x = 1 + x + \frac{x^2}{2!} + \dots + \frac{x^n}{n!} + \dots = \sum_{n=0}^{\infty} \frac{x^n}{n!}, |x| < \infty$
 $T_1 = A = \frac{qL}{2}$
 $T_2 = -B = -\frac{qL}{2}$
 $M = qa^2/1^2$
 $A = B = qa$
 $T_1 = -T_2 = A$
 $f = qa^2/3L^2 - 2a$
 $48EI$
 $\cos(\pi \pm \alpha) = -\cos \alpha$
 $\tan(\pi \pm \alpha) = \pm \tan \alpha$
 $\cos(2\pi k \pm \alpha) = \cos \alpha$
 $\tan(2\pi k \pm \alpha) = \tan \alpha$
 $\sin(\pi \pm \alpha) = \pm \sin \alpha$
 $\tan(\pi \pm \alpha) = \pm \tan \alpha$
 $\sin(2\pi k \pm \alpha) = \sin \alpha$
 $\tan(2\pi k \pm \alpha) = \tan \alpha$



Thank you!