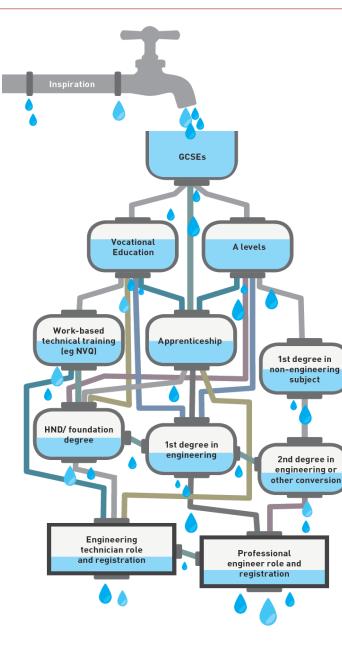


Professor John Perkins' Review of Engineering Skills



Department for Business, Innovation & Skills



The challenge

Engineering is pervasive

...engineering drives technological progress

...engineering skills are in demand throughout the economy

It would benefit the economy to substantially increase the supply of engineers entering the labour market

•The report makes 22 recommendations for action by Government, the profession and industry across the engineering "supply system"

•A call to arms:

"It is time for concerted action by the profession, industry and Government, to achieve the goals for engineering which we all share." **Employment Outcomes for Engineering Graduates:** key factors and diversity characteristics (RAEng Nov 2016)

For the 2013/14 graduating cohort:

- More than 80% of UK-domiciled graduates in employment within 6 months of graduation were in engineering occupations
- 7.7% of engineering graduates were unemployed after 6 months from graduation

However:

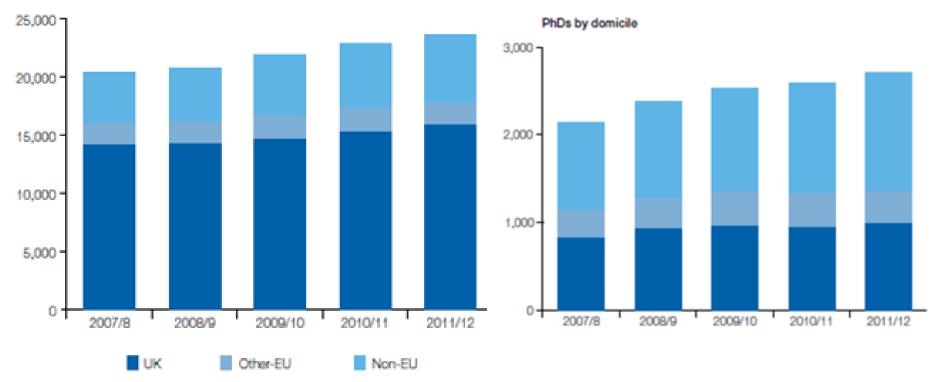
- BME graduates, those over 25 years of age, females, those with 2.2 or 3rd class degrees and graduates from post-92 universities were less likely than average to be in engineering occupations six months after graduation
- In contrast, white, those aged 25 or under, male, those with first class or 2.1 degrees and graduates from Russell Group universities were more likely than average to be in engineering occupations

Higher

Education

Engineering and technology degrees awarded by UK HE institutions by domicile

First degrees by domicile includes integrated Masters



Some conclusions

- Relax entry requirements to broaden intake
- A strong emphasis on project work
- Industry engagement in design
 and delivery
- Experience of the workplace for students









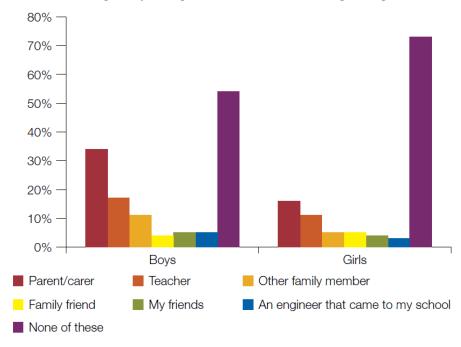
Degrees v Apprenticeships – a rapidly evolving landscape

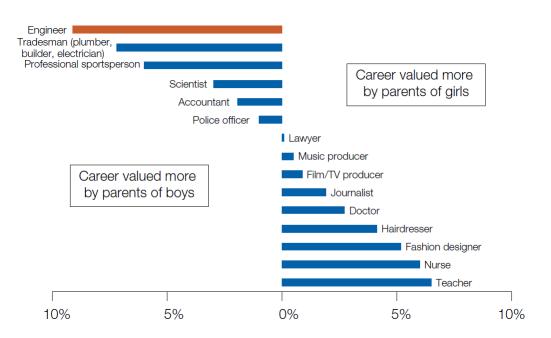
- Higher tuition fees leading to significant graduate indebtedness
- Apprenticeships emerging leading to higher (including degree-level) qualifications
- Industry's enthusiasm for apprenticeship routes
- Government's commitment to increase significantly the numbers of apprenticeships

PARITY OF ESTEEM?

Inspiration – how are we doing?

Who has encouraged boys and girls to consider a career in engineering?¹⁴

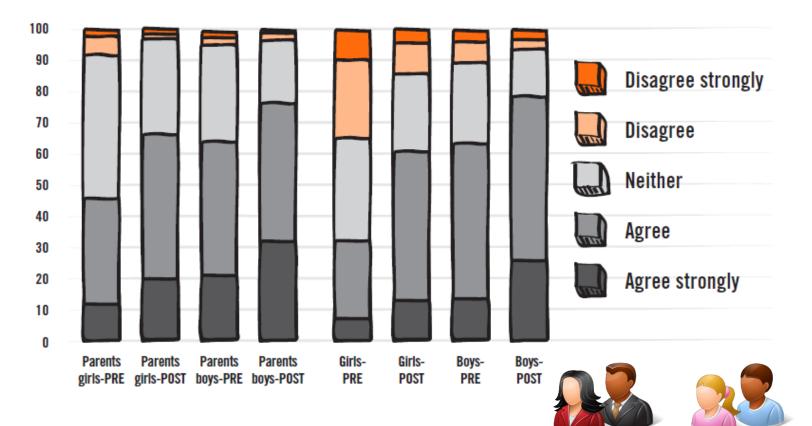




Which career would parents most like their child to pursue?

Informed opinions of engineering

PARENTS - I would encourage my child to go into Engineering CHILDREN - I would consider a job in Engineering



Base: Children (1007)

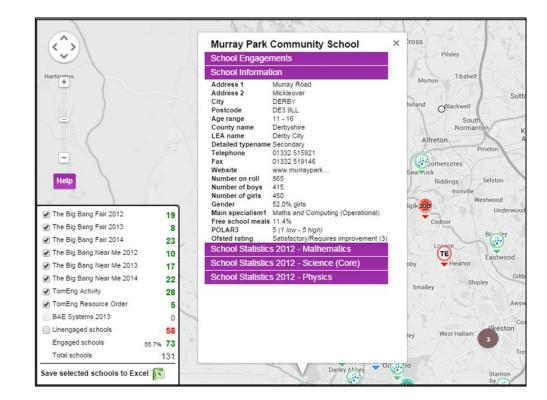
UKRC / WISE	LMS		Discovery ntres	STEM teacher s				Prominent STEM funders		
AFBE - UK	JMC	Tech	niquest	Design and Technology Assoc (DATA)		NCETM		Salters Institute	BITC	
Generating	MEI	Sci	ience			National STEM Centre		NESTA	Sutton Trust	
Genius WES	IMA and other Mathematics comn		iseum oyal	Assoc of S Educators		Science Learning Centres (regional)		Gatsby Foundation	ERA Foundation	
Diversity organisations		Observatory		NAACE subject a	•	SSAT		Wellcome Trust	1851 Commission	
STEM Activities	SCHOOLS	Baker-De	Baker-Dearing			Teach First Teaching Leaders		Nuffield Foundation	Reece Foundation	
Big Bang Fair	FE & Skills	AoC		Computing at School				Lloyds Register		
STEM Directories	Higher Education	UUK				National Space		Ogden Trust	Others	
Bloodhound	Education	institutions		EMPLOY		Academy	Ogden Hust		Livery	
Arkwright	Companies									
Industrial Cadets	STEM EDUCATION STAKEHOLDER MAP Science community Royal Society Royal Institution									
EDT	R	yal T		he Engineering		FEANI, SEFI		Royal Soc	Others	
Smallpeice		emy of	my of sering 36 En					Chemistry	e.g Royal Astronomical, Royal Geological,	
Young Engineers		, neering			No	on licenced		oc of Biology		
Primary Engineer	Engin	eering UK		stitutions MechE, ICE)		engineering stitutions (IMI)		nst of Physics	etc.	
Tomorrow's Engineers	Awarding bodies			HE, FE & skills			S	cience Council		
STEMNET	AQA 5-19 education		BIS							
Education and	Edexcel					г		STEM policy		
Employers	OCR	DFE	Ξ	National Careers Service		Sector Skills		E4E	EPC	
Taskforce	WJEC OF		AL			Sector Skills Councils		ACME	NCUB	
EBPs	EAL	OFSTE	OFSTED		hip	(SEMTA, COGENT,		SCORE	CASE	
CODING CLUBS	City and Guilds	TDA / 1	ГА	Service HEFCE / HEF	cw	E-Skills)		UKforCE	СВІ	
his is an indicative landscape.				ETF		UKCES		lextGen.Skills	EEF	

rhys.morgan@raeng.org.uk (May 2014)

UKCES NextGen.Skills

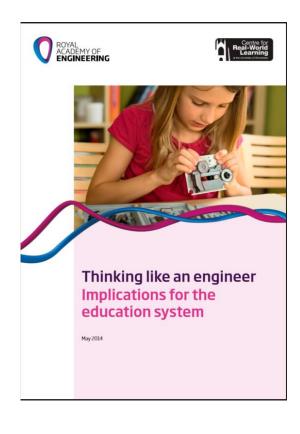
Tomorrow's Engineers database

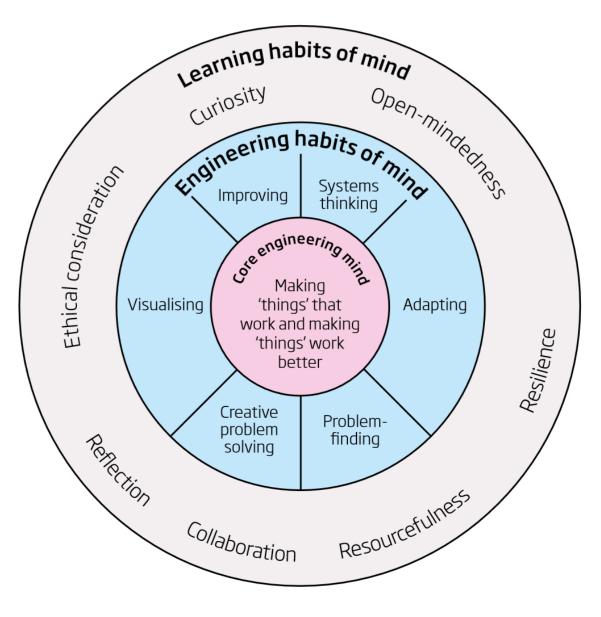
- •Open access database to highlight school engagement
- •Identify local schools
- •Prevent duplication of activity
- •Highlight low attaining schools
- •Identify schools which are hard-to-reach
- •Success will be in the usage by all stakeholders





Engineering habits of mind







Engineering habits of mind

Figure 1 - Centre for Real-World Learning engineering habits of mind						
Systems thinking	Seeing whole systems and parts and how they connect, pattern-sniffing, recognising interdependencies, synthesising					
Problem-finding	Clarifying needs, checking existing solutions, investigating contexts, verifying					
Visualising	Being able to move from abstract to concrete, manipulating materials, mental rehearsal of physical space and of practical design solutions					
Improving	Relentlessly trying to make things better by experimenting, designing, sketching, guessing, conjecturing, thought-experimenting, prototyping					
Creative problem-solving	Applying techniques from different traditions, generating ideas and solutions with others, generous but rigorous critiquing, seeing engineering as a 'team sport'					
Adapting	Testing, analysing, reflecting, rethinking, changing both in a physical sense and mentally.					

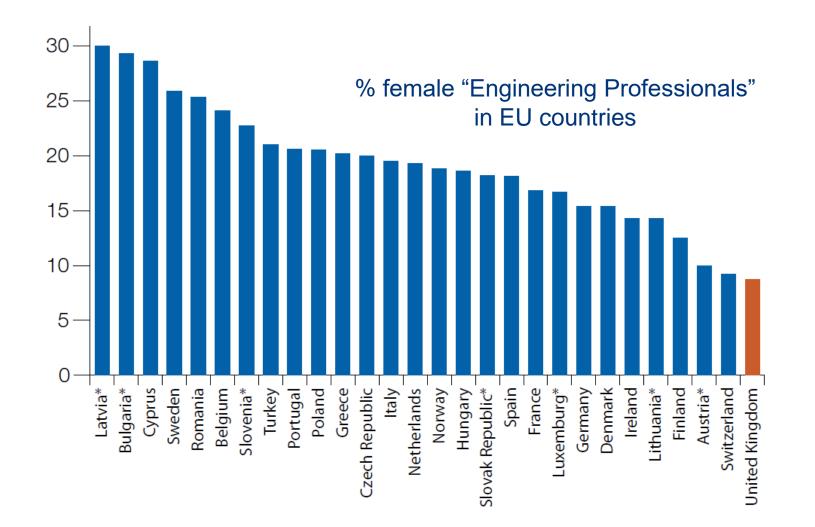


Thinking like an Engineer

Creating a movement:

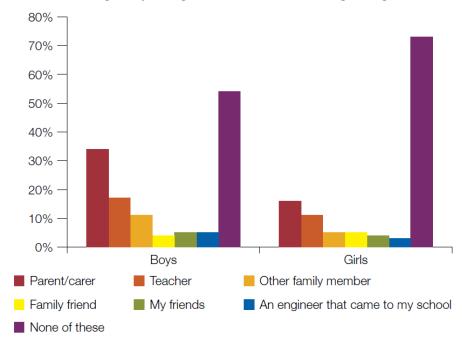
- Primary schools in Manchester
- Secondary schools in Hampshire
- JCB Academy in Staffs
- Barclays Lifeskills
- CBI
- Engineering Talent Project

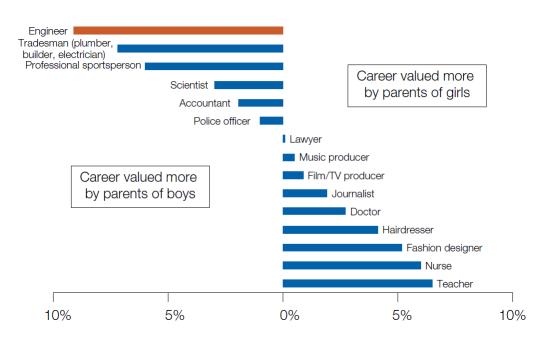
Women and engineering... the challenge



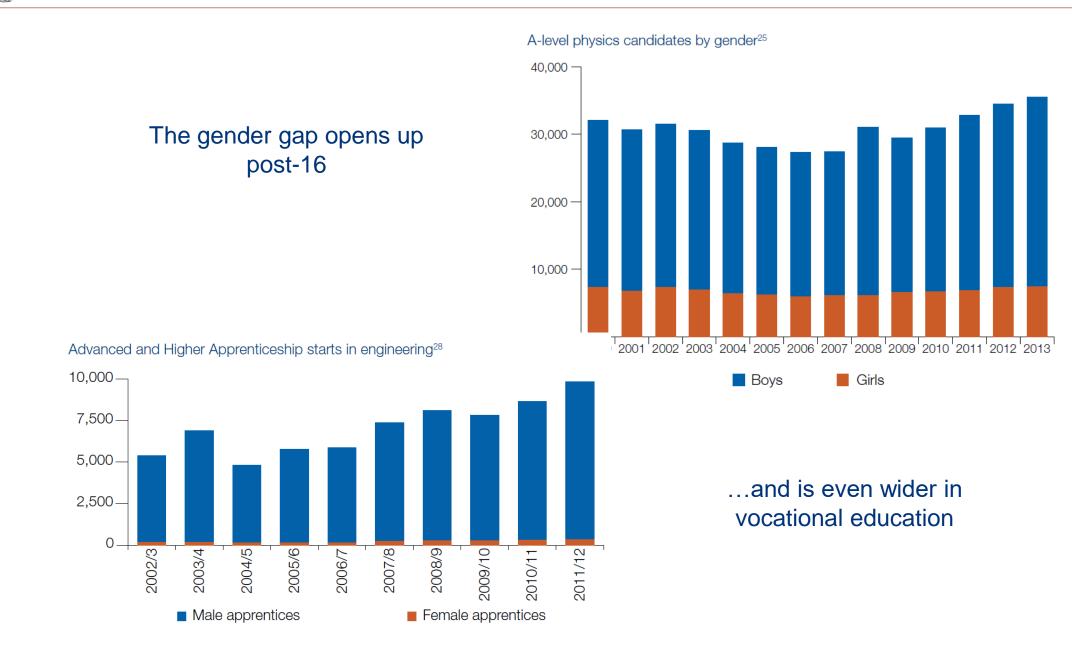
Women and engineering... why the gap?

Who has encouraged boys and girls to consider a career in engineering?¹⁴

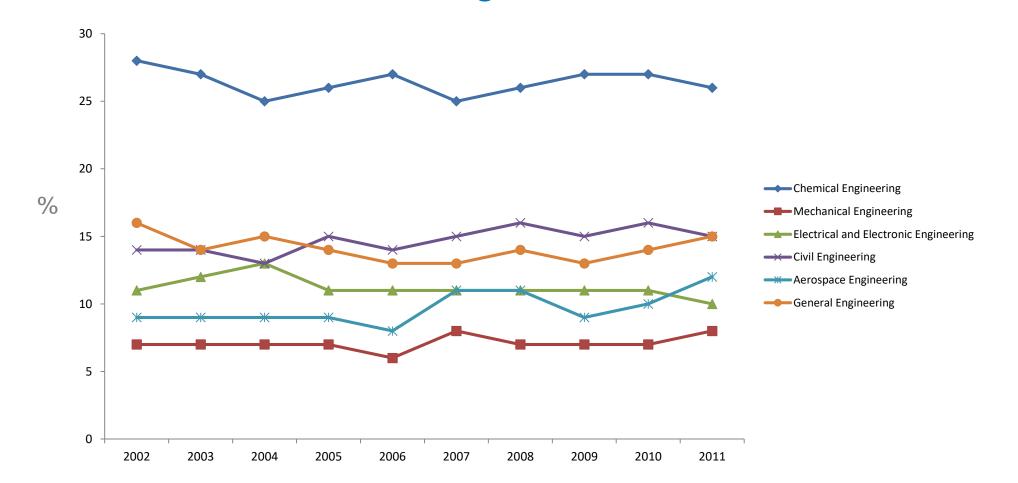




Which career would parents most like their child to pursue?



Female undergraduates





Marketing the dream: the engineering talent project

The components of the solution: how it all fits together



0 0

Building demand by making the career more appealing

Public affairs: to lobby for structural change e.g. funding for career switchers; incentives to delay retirement Industry: Target talent not qualification; create more pathways including apprenticeships Advertising & Branding: Build awareness and appeal

PR & Social Create fame and improve the image of engineers

Tomorrow's Engineers Give young people a positive experience of engineering



What is the Year of Engineering?



What is the Year of Engineering?

- The Year of Engineering 2018 is an HM Government initiative to inspire the next generation of engineers in the UK
- The Departments for Transport, Business, Energy & Industrial Strategy, Education and the Ministry of Defence are leading the campaign
- So far 150 partners have pledged their support from a range of sectors, including EEF



Why have a Year of Engineering?





- Big skills shortage and lack of diversity in engineering
- Crucial to the economy
- Key part of the Government's policy agenda

(Investing in skills and sectors in the *Plan for Britain*, supporting the *Industrial Strategy* by boosting STEM, building transport skills in DfT's *Infrastructure Skills Strategy*)

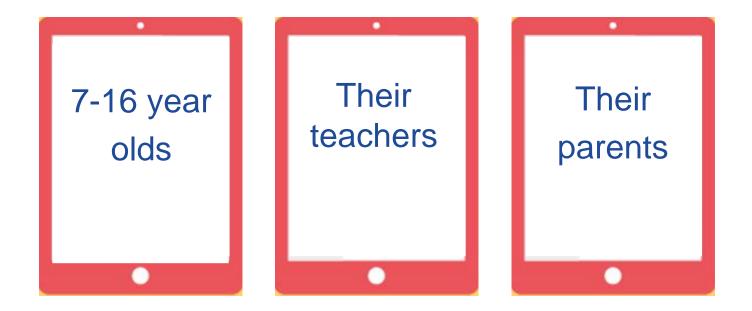
- Engineering is undervalued and misunderstood
- Multiplicity of initiatives



A year-long, cross-Government campaign aiming to raise the profile of engineering amongst 7 to 16 year olds and widen the pool of young people that consider engineering as a career.

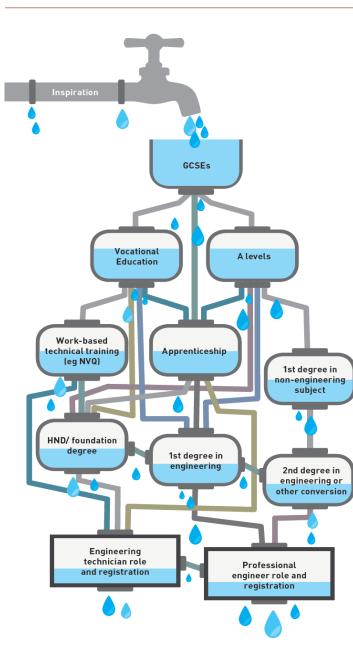


Who we want to reach





Department for Business, Innovation & Skills



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