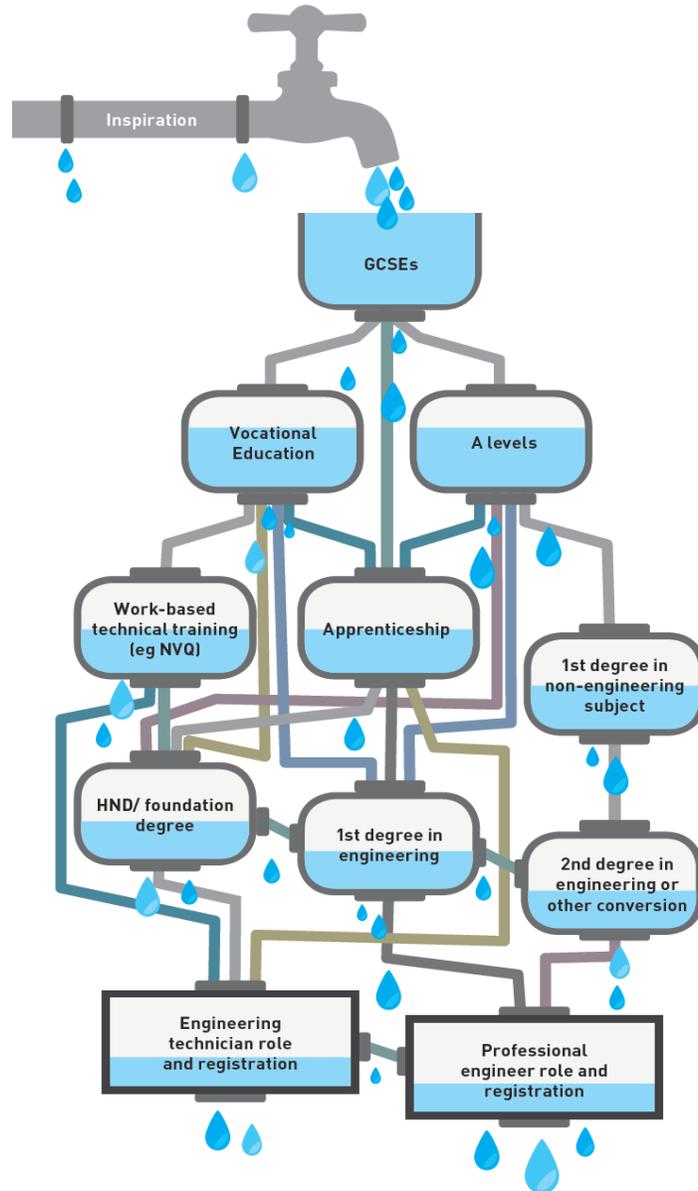




Professor John Perkins' Review of Engineering Skills





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

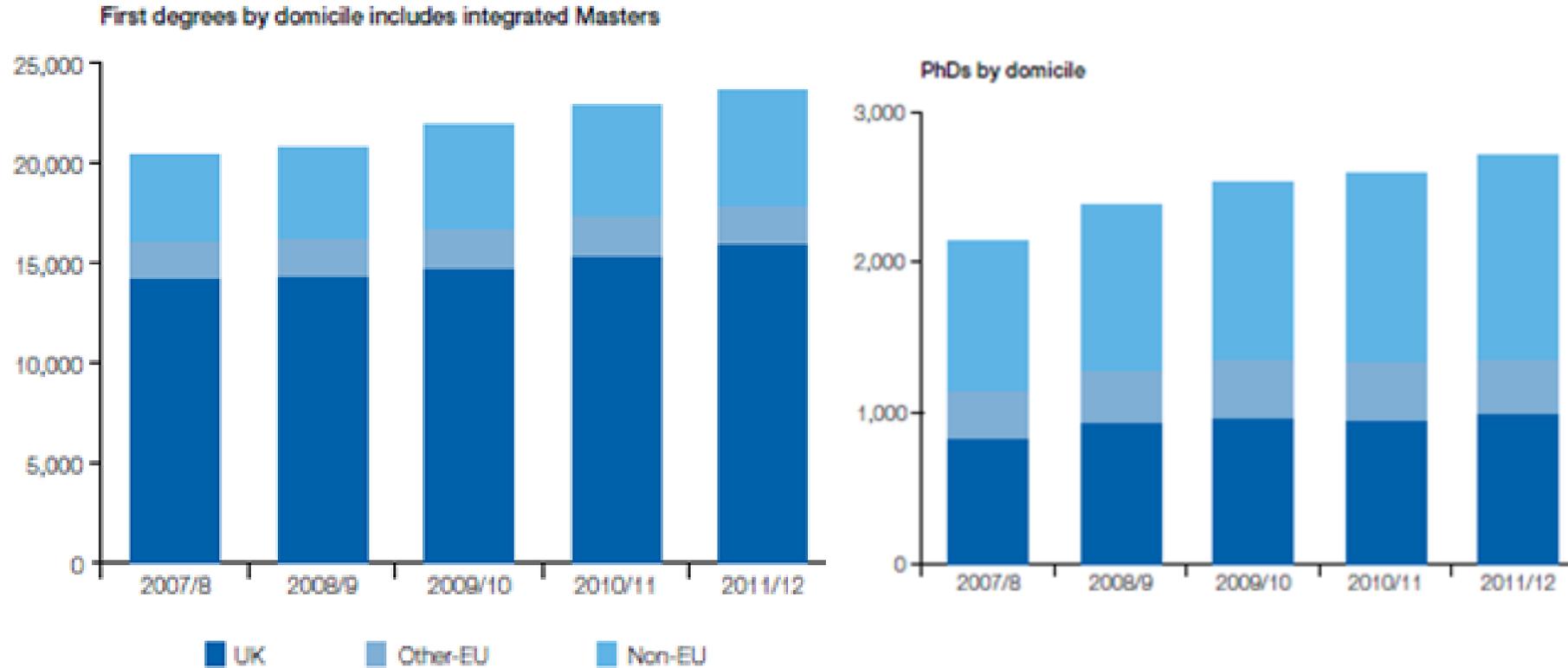
However:

- 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



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



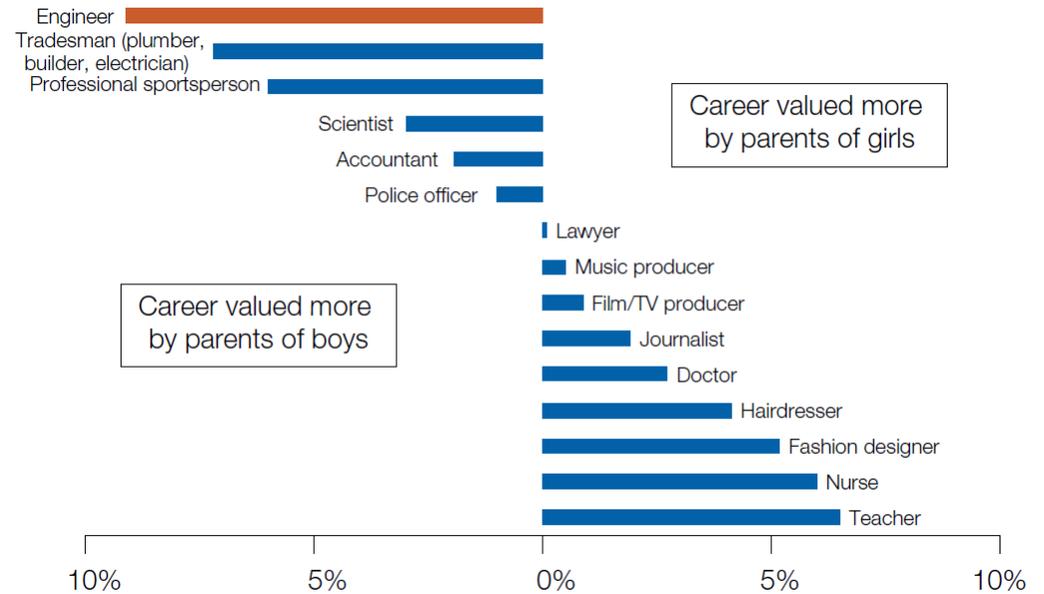
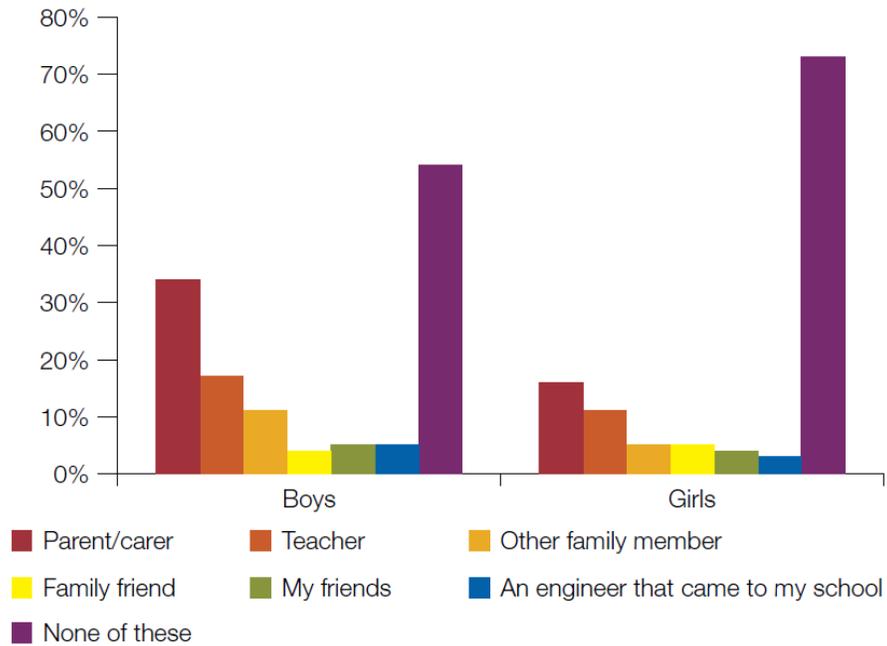
Degrees v Apprenticeships – a rapidly evolving landscape

- 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

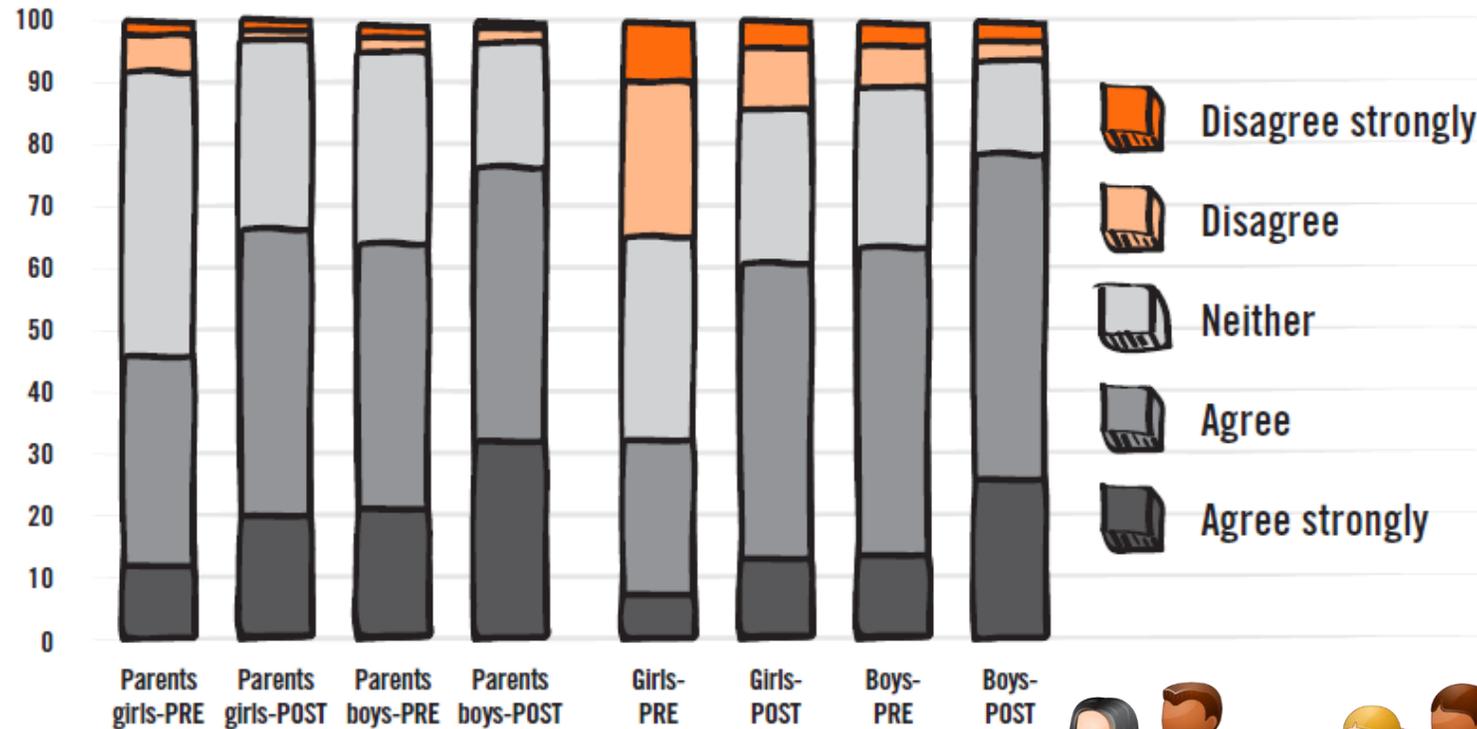


Which career would parents most like their child to pursue?

Informed opinions of engineering

PARENTS - I would encourage my child to go into Engineering

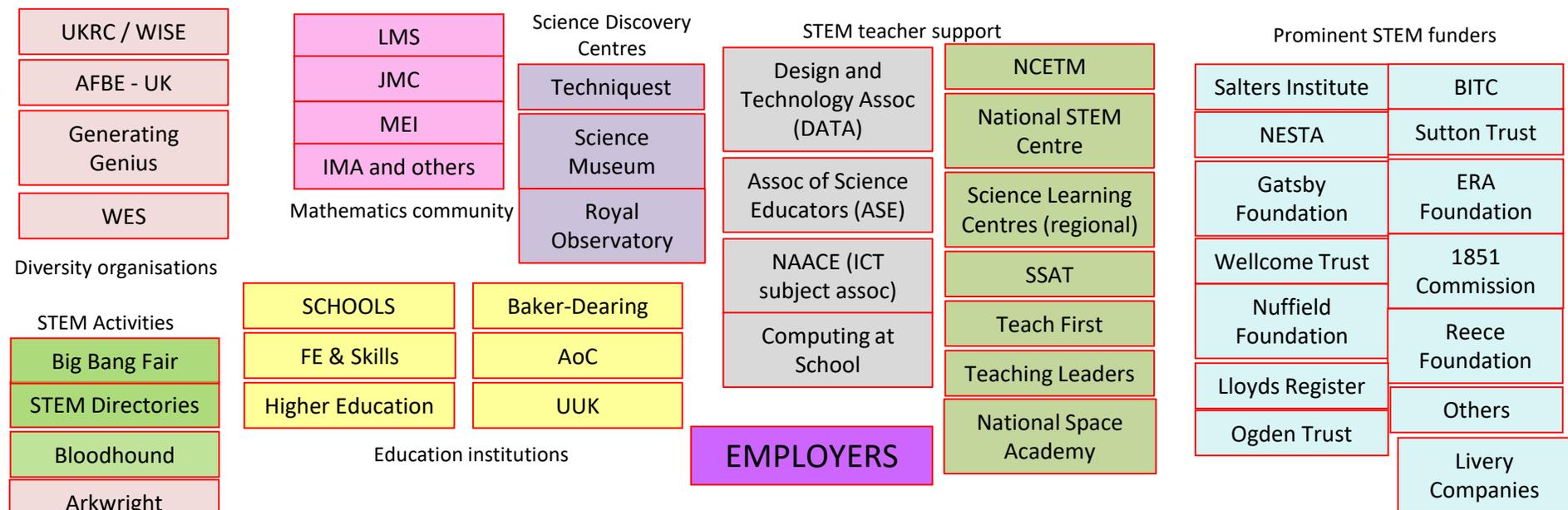
CHILDREN - I would consider a job in Engineering



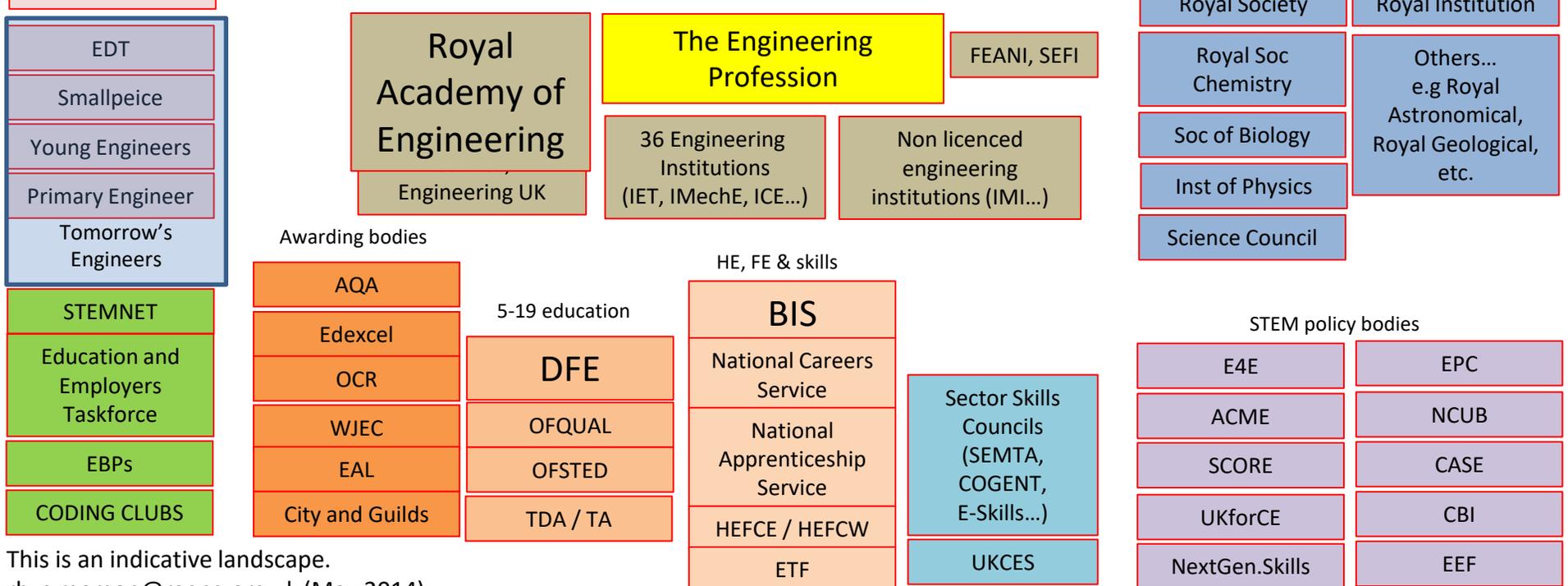
Base: Parents (1007)



Base: Children (1007)



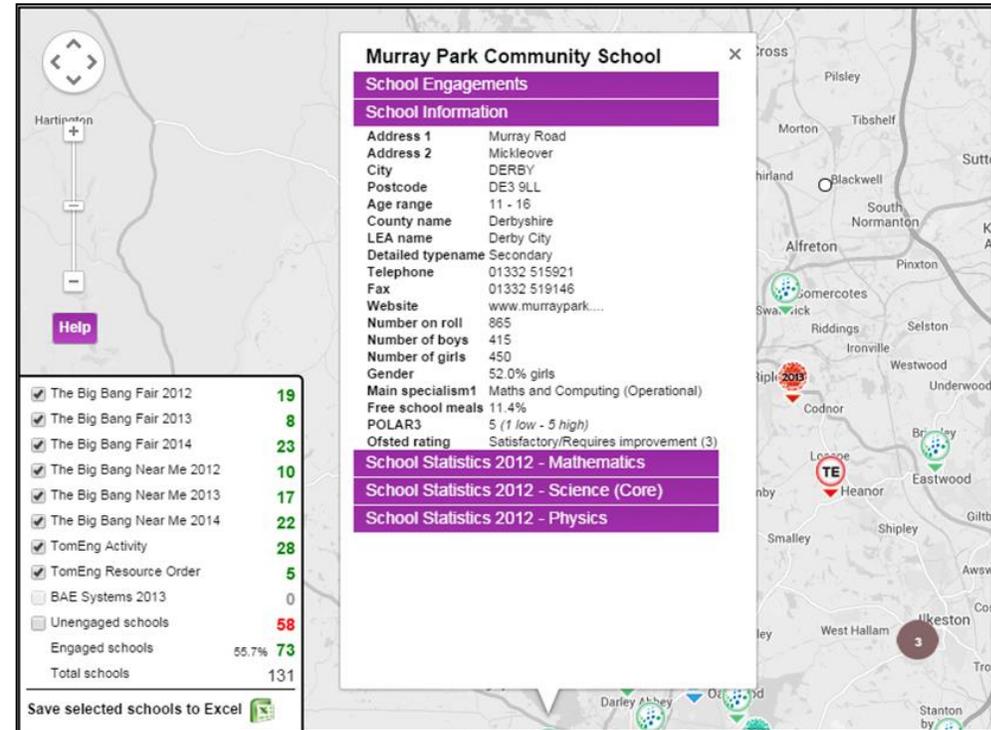
STEM EDUCATION STAKEHOLDER MAP



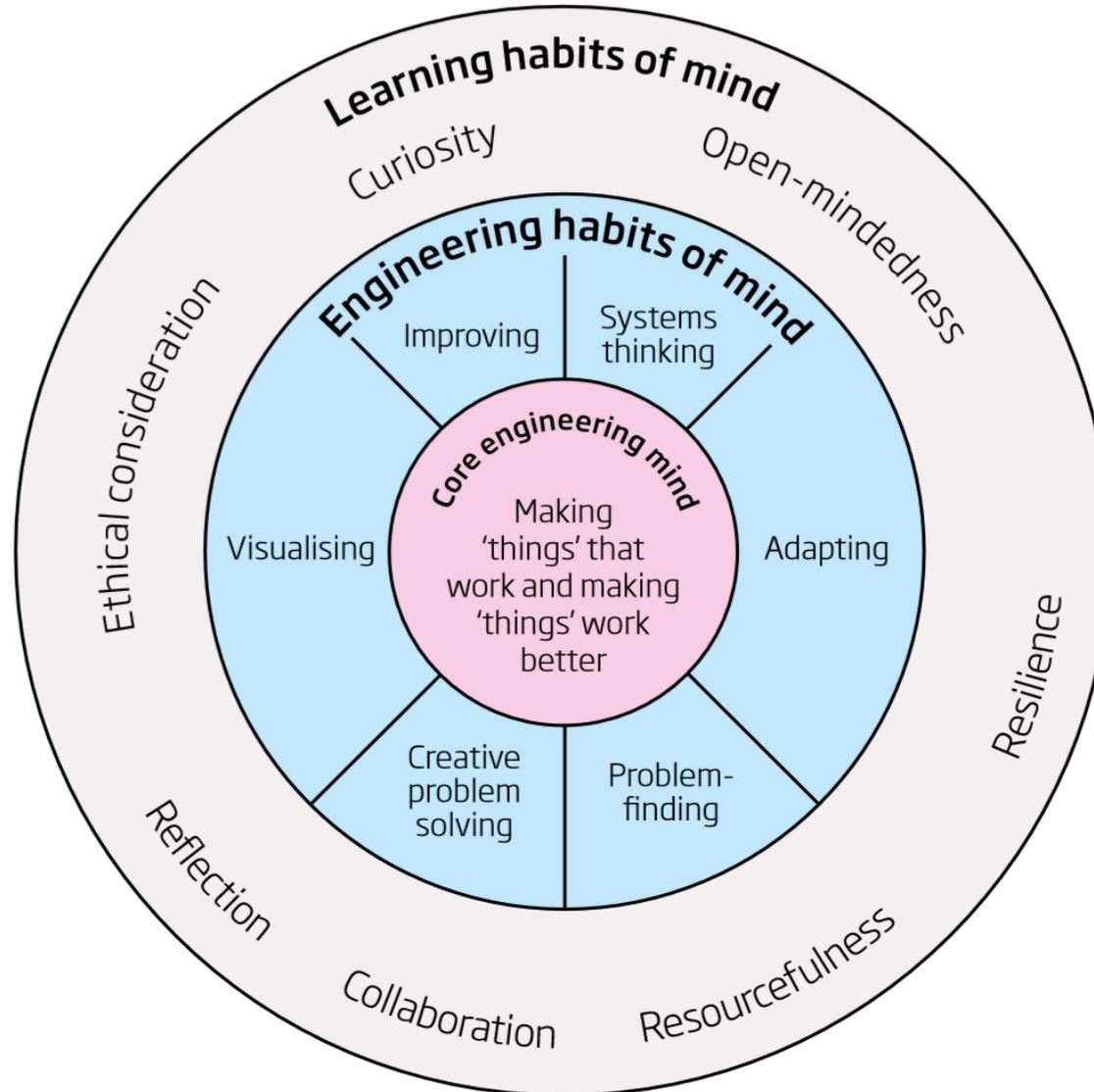
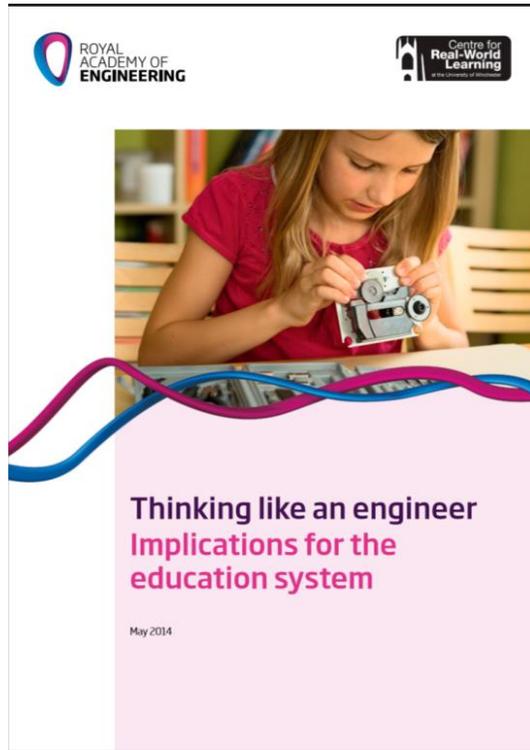
This is an indicative landscape.
 rhys.morgan@raeng.org.uk (May 2014)

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.

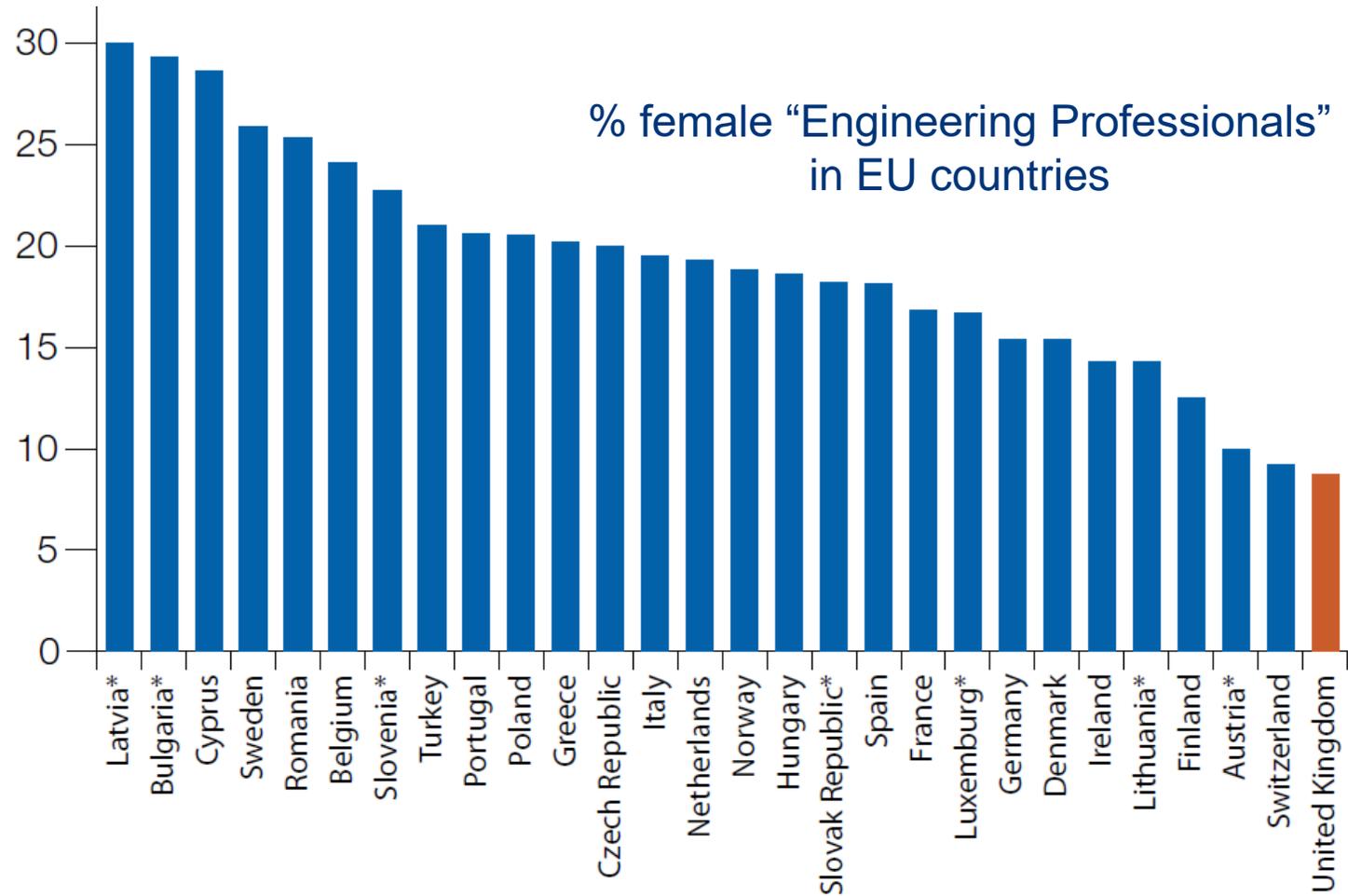
Thinking like an Engineer

Creating a movement:

- Primary schools in Manchester
- Secondary schools in Hampshire
- JCB Academy in Staffs

- Barclays Lifeskills
- CBI
- Engineering Talent Project

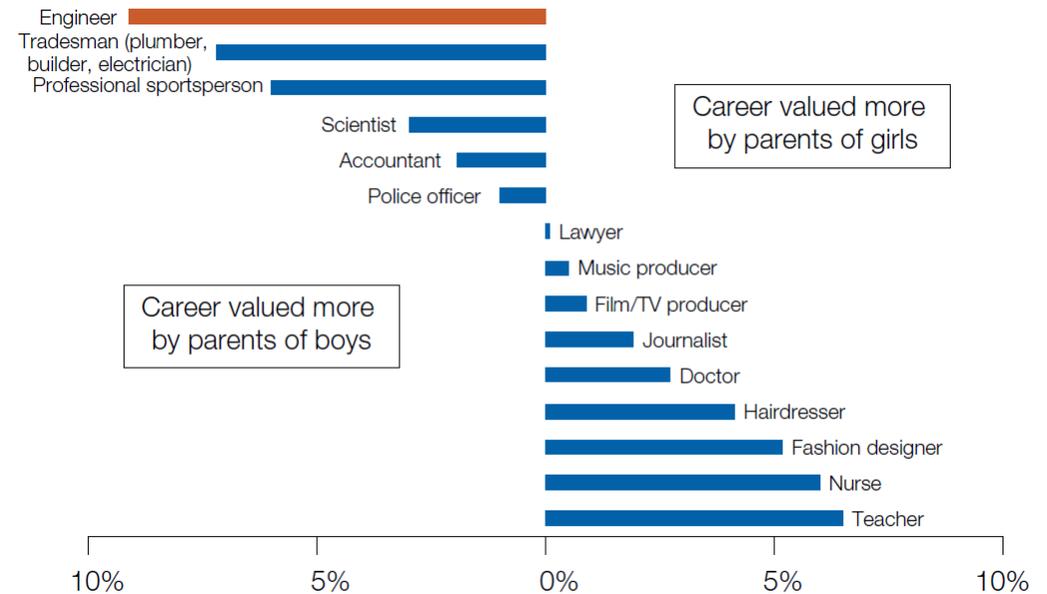
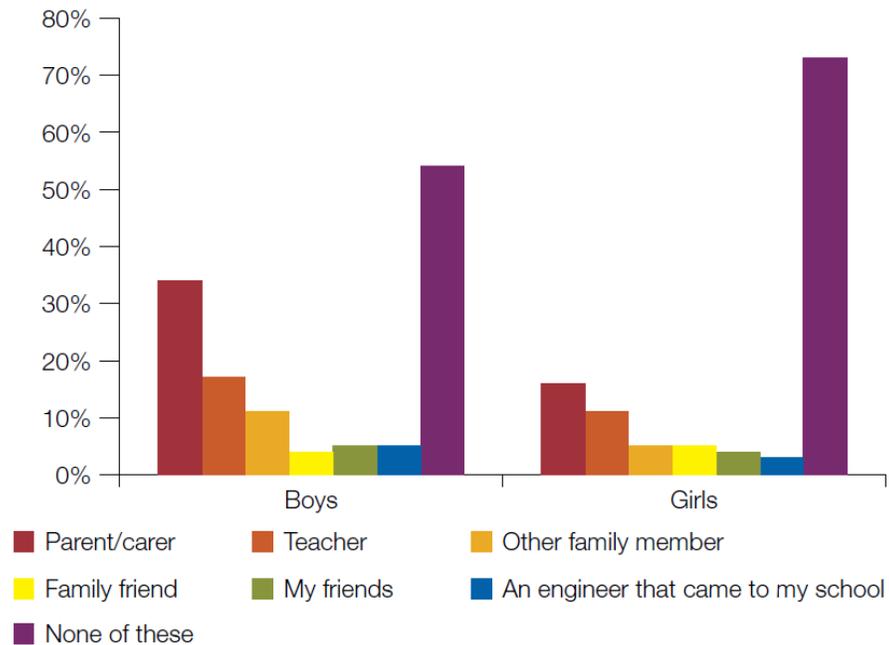
Women and engineering... the challenge





Women and engineering... why the gap?

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

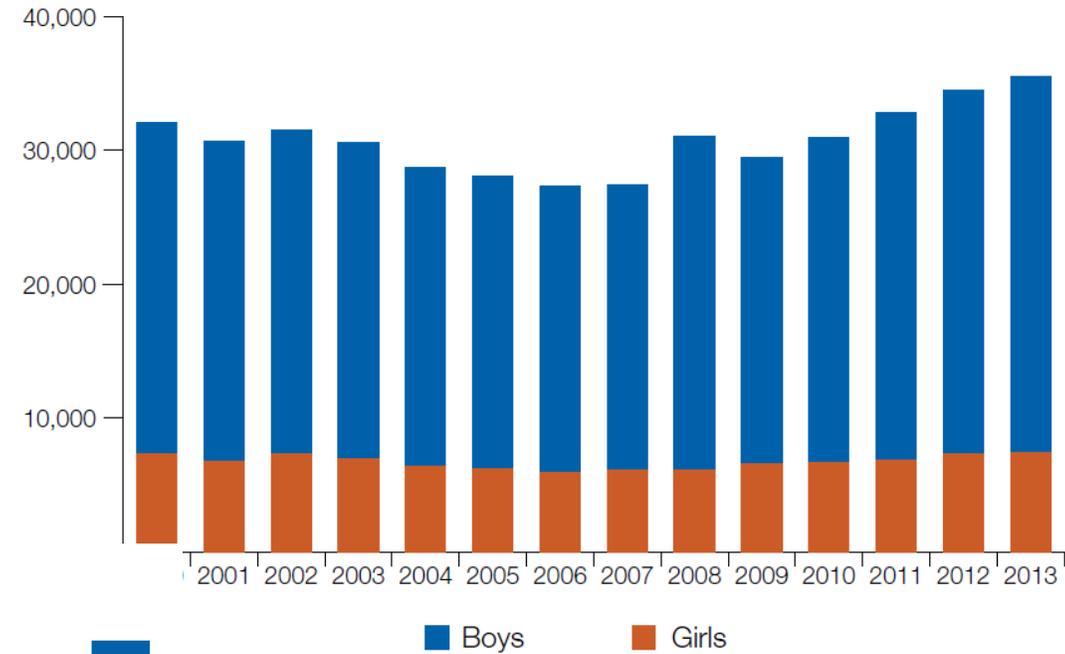


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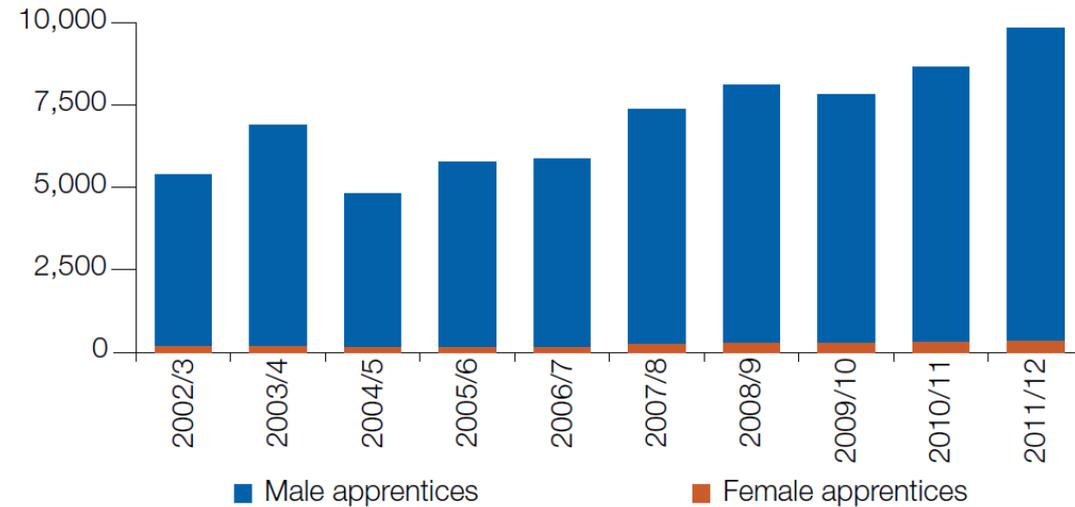


The gender gap opens up post-16

A-level physics candidates by gender²⁵

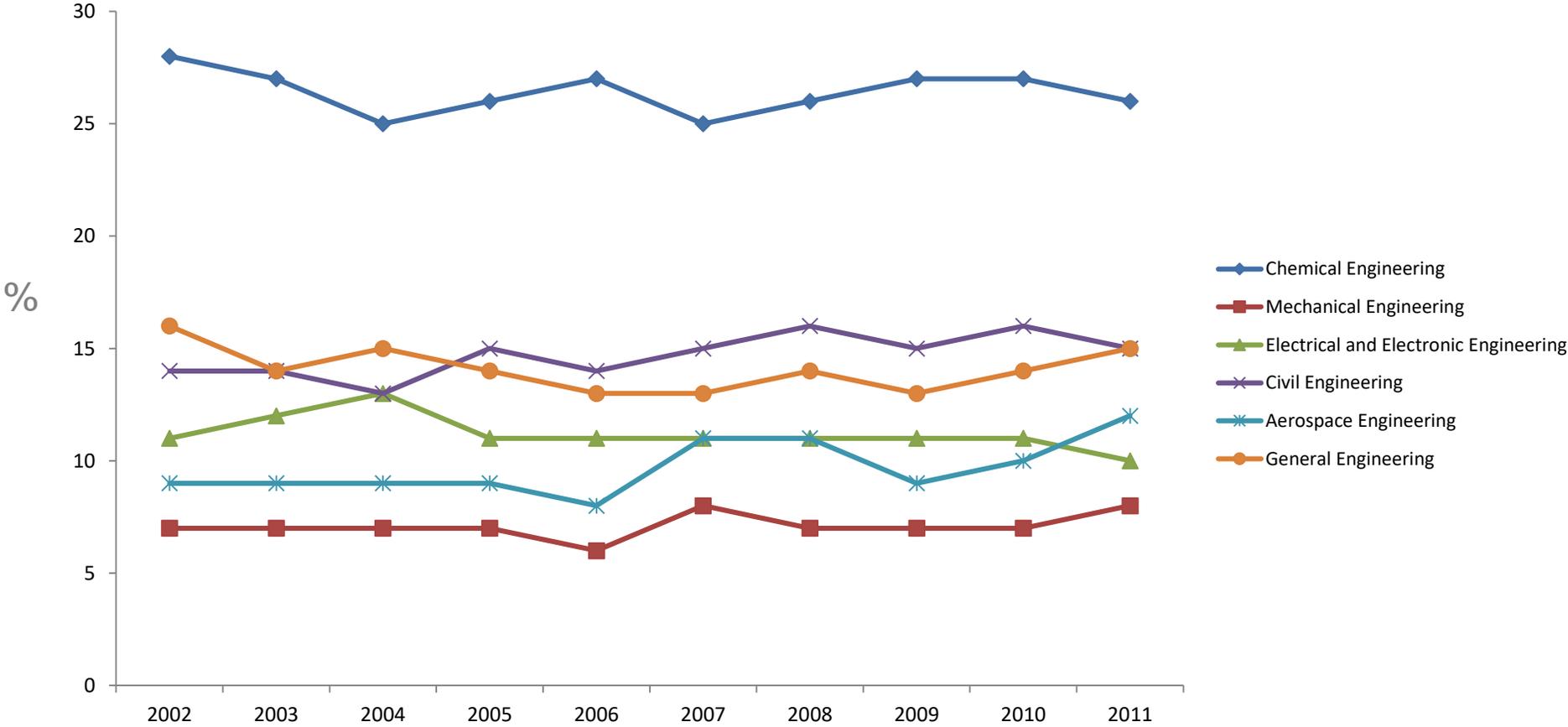


Advanced and Higher Apprenticeship starts in engineering²⁸



...and is even wider in vocational education

Female undergraduates





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Marketing the dream: the engineering talent project

The components of the solution: how it all fits together

Supply-side solutions
designed to
open up access to the career

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?



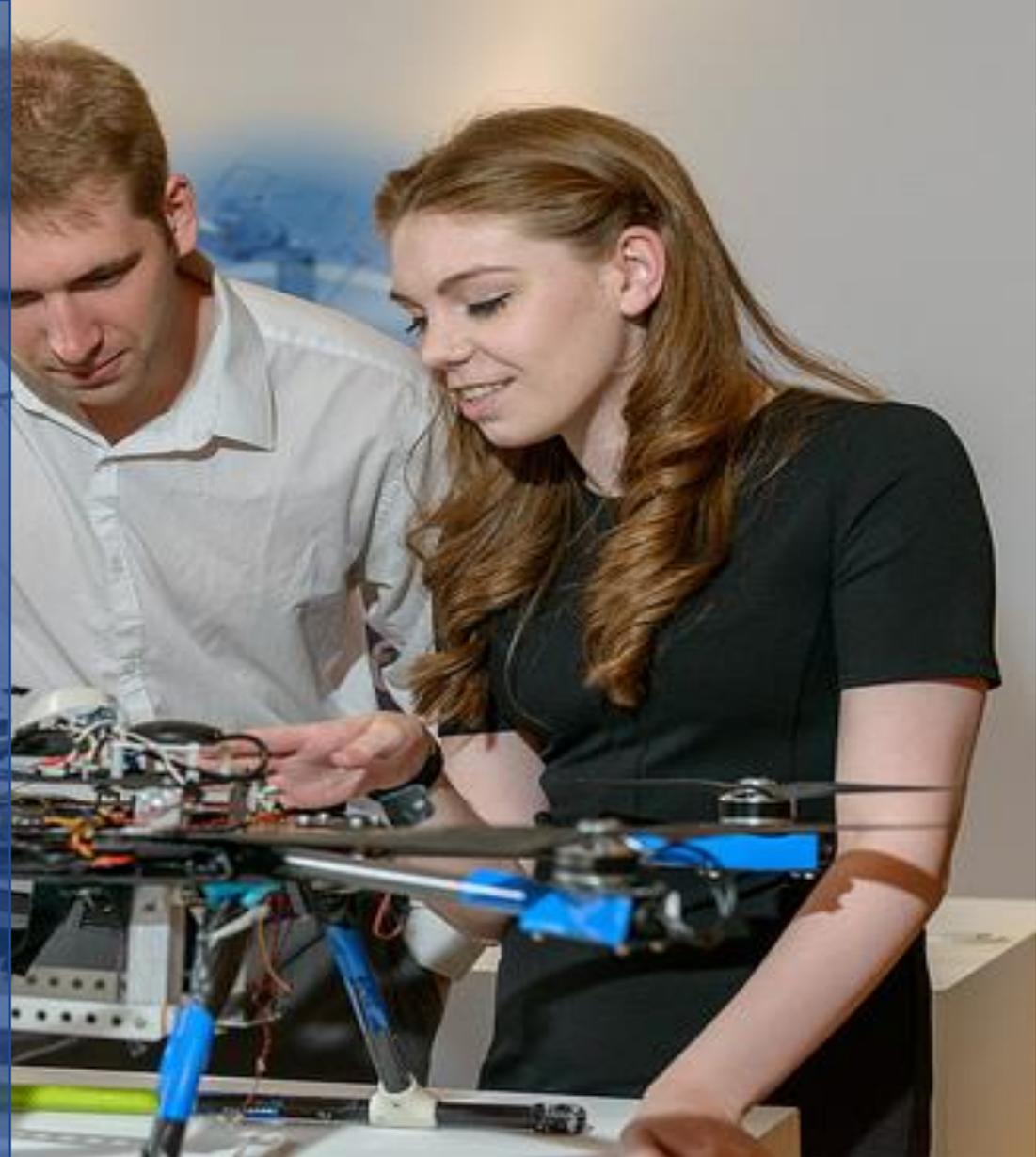
- Big skills shortage and lack of diversity in engineering
- Crucial to the economy
- Key part of the Government's policy agenda



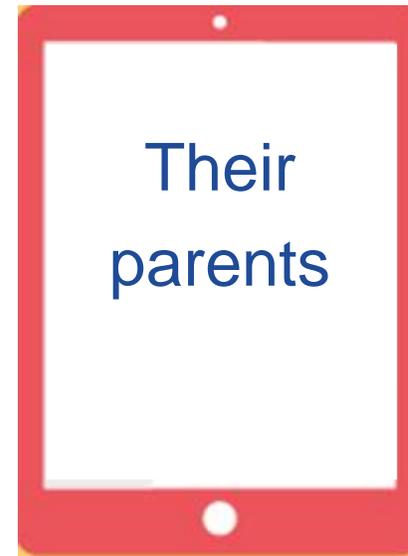
(Investing in skills and sectors in the *Plan for Britain*, supporting the *Industrial Strategy* by boosting STEM, building transport skills in DfT's *Infrastructure Skills Strategy*)

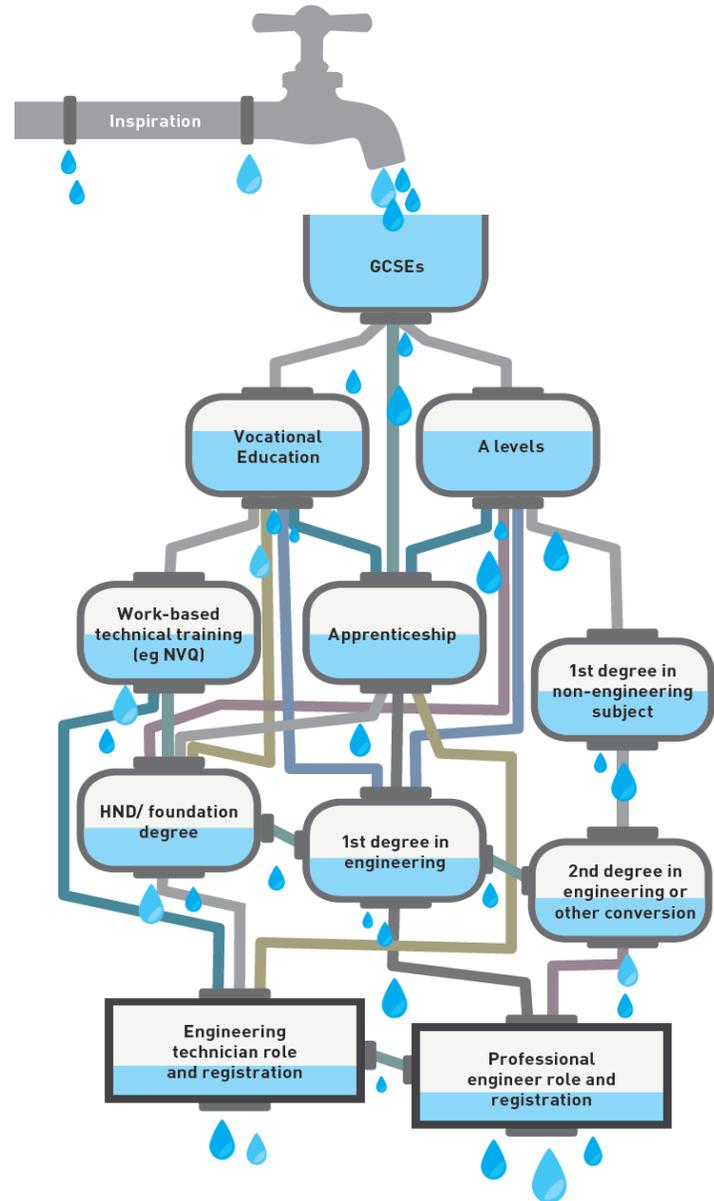
- Engineering is undervalued and misunderstood
- Multiplicity of initiatives

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





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