POLICY REVIEW

DIVERSITY

SUMMARY

There is a growing recognition of the benefits of diversity and inclusion, in addition to the moral case, particularly in its importance in meeting skills gaps and maximising productivity.

The pace of change is increasing, with efforts from across the sector resulting in significant progress in gender diversity in some areas in the last 20 years. More recently, increased awareness has been brought to other areas, such as ethnicity, disability and socio-economic inequality, but continued specific and intentional efforts are needed to ensure that this momentum is sustained.

People with multiple under-represented characteristics face the greatest challenge, so future research and efforts must take account of the effect of this intersectionality.

1

A CAREERS STRATEGY THAT MEANS BUSINESS

Embed diversity and inclusion throughout a joined-up careers strategy and do more to encourage flexible working practices and career pathways.

2

DECISIVE ACTION ON DIVERSITY DATA

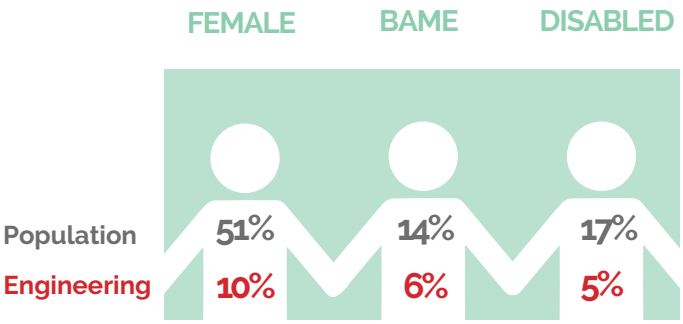
Government should coordinate central analysis and monitoring to understand causes of under-representation, ensuring evidence can inform action taken by Government and other organisations.

CaSE
Campaign for Science and Engineering

WHY DOES DIVERSITY MATTER?

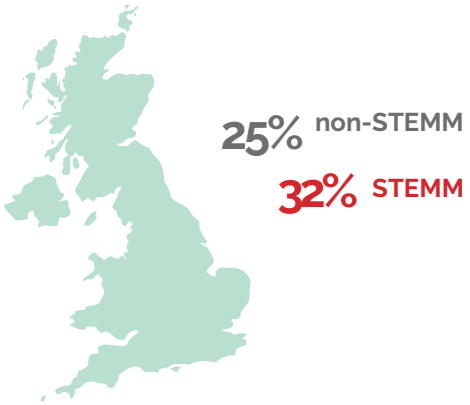
We face the LARGEST skills gaps in areas with the LOWEST diversity

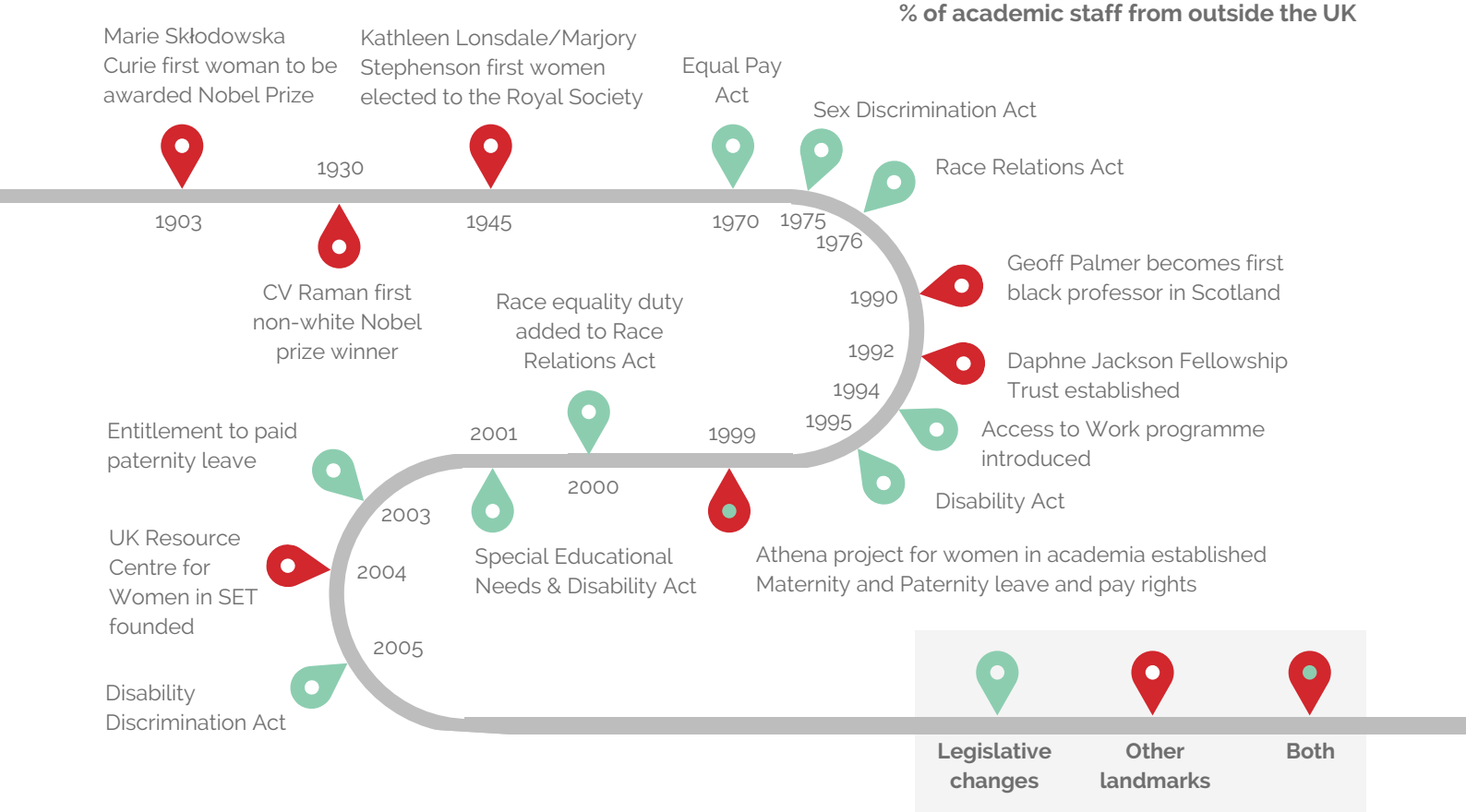
- Of the five areas with the highest net job requirements, four have less than 25% women. (1)
- There is an annual shortage of 20,000 engineers but in the engineering workforce only: 10% are women, 6% BAME and 5% have a disability, compared to 51%, 14% and 17% of the working population. (2)(3)



STEM skills gaps will be a growing challenge

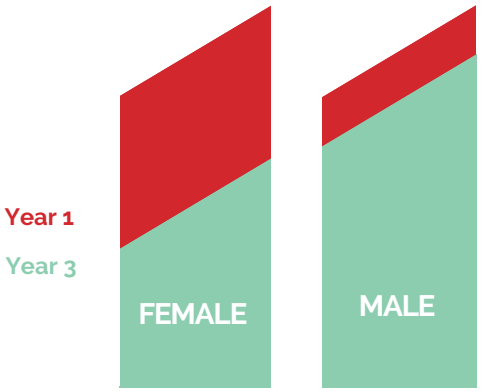
- STEM-related jobs are expected to rise at double the rate of other jobs up until 2023, including in non-traditional STEM areas such as retail, PR, consultancy and legal. (1)
- Future changes to migration, in light of Brexit, are of particular concern to the STEMM* sector where 32% of academic staff are from outside the UK (up to 56% in chemical engineering) compared to 25% for non-STEMM. (4)
- 67% UK CEOs report difficulty recruiting people with digital skills, compared with only 43% in the US and 24% in China. (5)





Ingrained beliefs about who works and succeeds in STEMM can undermine investment in people

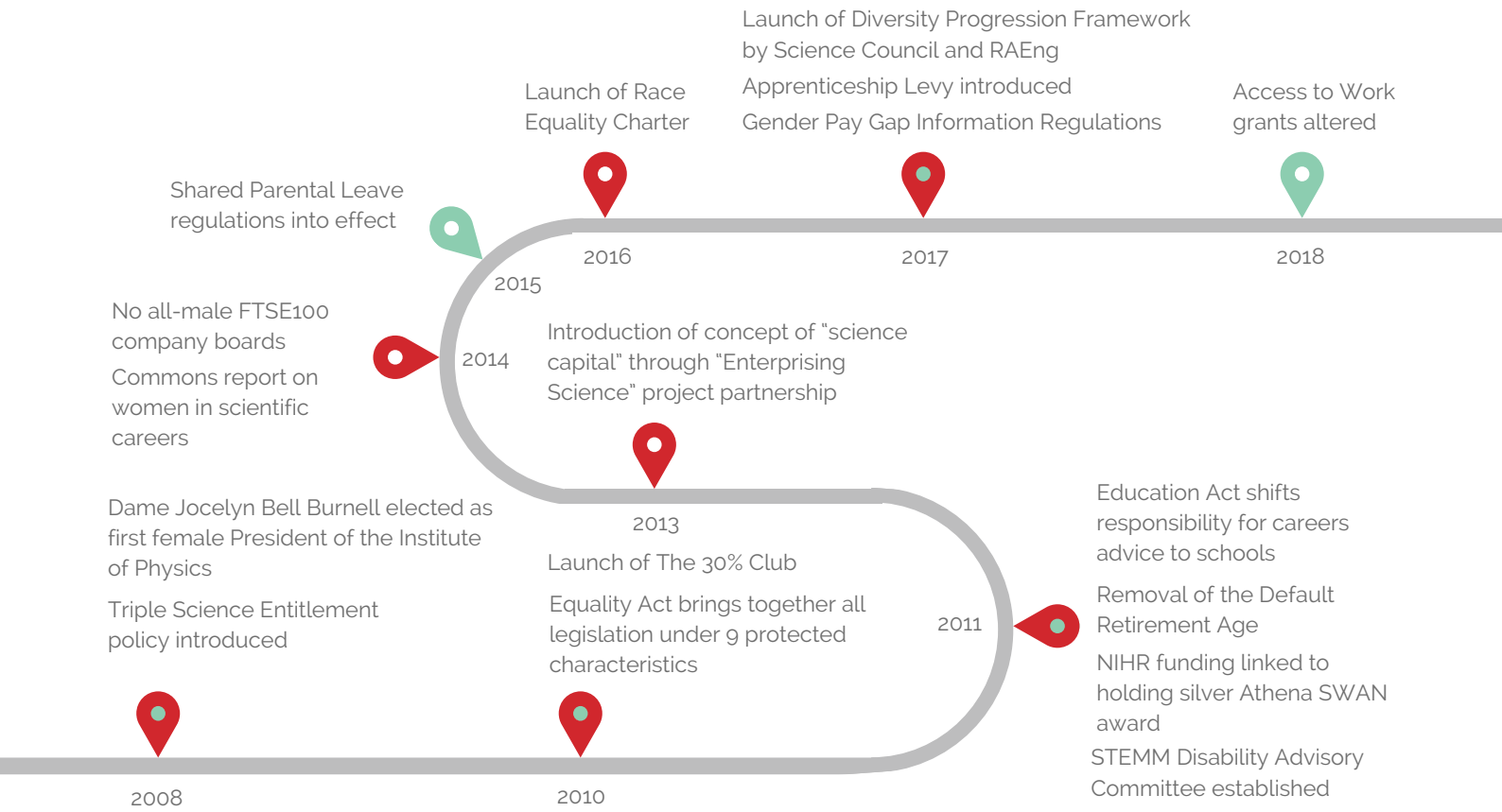
- Funding for a PhD student costs ~ £100K but all under-represented groups are more likely to be put off staying in academia due to the working style and culture.
- For female Chemistry PhD students, intention to pursue a research career drops by almost half between first and third year, but changes by only 2% for men. (6)



Intention to pursue a research career among Chemistry PhD students

Diversity & inclusion benefits individuals and organisations

- 80% of engineers report increased motivation when they feel included, 68% increased performance and 52% increased commitment. Greater inclusion results in being more confident about speaking up on improvements or safety concerns and seeing a future for themselves in engineering. (3)
- Both women and men have seen a personal benefit from Athena SWAN in a healthier work-life balance, access to flexible working, training opportunities and transparency in promotions. (7)
- Companies in the top quartile for gender diversity have 15% increased financial return; and for ethnic diversity, 35% increased return. (8)



WHAT'S CHANGED? IN EDUCATION

Some gaps persist:

In 2015, the least deprived third of GCSE students were 2.2x as likely to take separate sciences as the most deprived third, which has a big impact on progression to A-level. (9) .

Despite sustained efforts to the contrary, in 2016 boys remained 4.1x more likely than girls to take A-level Physics, compared to 4.3x in 2011. (10)

The proportion of women studying undergraduate degrees in engineering and technology disciplines has barely changed from 16% in the six years from 2009 to 2015, although the proportion in post-graduate study has increased from 21 to 24%. (4)

Between 2009-15 there was a 1.5x increase in the total percentage of STEMM students declaring disability. But, this rate was 1.8x lower for research postgraduates than first degree undergraduates, and lower than for other subjects. (4)

Pupils of black ethnicity continued to be least likely to take A-level Physics, although increasing from 0.7x to 0.8x relative to the total cohort. (10)

Some gaps have closed:

Gender differences in uptake of GCSE science subjects have largely disappeared.

A-level Chemistry reached 50:50 gender split in 2017. (11)

The proportion of pupils in England of black and 'other' ethnicity taking A-level Computing relative to the rest of the cohort almost doubled from 2011-16. (10)

Other gaps are growing:

In GCSE IT, overall uptake is increasing but the relative proportion of boys to girls taking the subject has increased from nearly even (1.1x) in 2011 to double (2x) in 2016. (10)

At A-level, relative proportions of boys have also increased for:

- Maths – from 1.7x to 1.8x
- Further Maths – from 2.5x to 2.9x
- ICT – from 1.9x to 2.1x

For Biology, this proportion has fallen from 0.9 to 0.7. (10)

For the most socio-economically advantaged third of students there appears to be no gender difference in A-level STEM subject choices, but differences become evident for the less advantaged. (12)

42% of all disabled students received DSA in 2015/16, but only 28% of postgraduate research students, and this has started to drop since 2013/14. (4)

Despite an increase in the number of female STEM apprentices, the proportional total has decreased from 8.4% in 2011/12 to 7.5% in 2015/16, whilst for engineering and manufacturing technologies this has increased from 3.8% to 6.8%. (13)(14)

For students previously attending state schools, the overall entry rate to higher education of those who received free school meals was half that of those who did not, and the difference in 2015 is the largest ever recorded. (15)

First degree qualifiers from routine occupational backgrounds progress to research degrees at half the rate of those from higher managerial and professional occupational backgrounds, and this is not improving. (16)

IN THE WORKFORCE

Employment inequalities persist:

The percentage of women in the core engineering workforce has risen only 1.4 percentage points over 10 years, to 9.8% in 2016. (2)

The unemployment rate for 2013/14 engineering graduates after 6 months was 2.3x higher for BME than white graduates, increasing from 2.1x in 2010/11. This gap persists for graduates achieving a 1st or 2:1. (17)

On average male physical science graduates initially earn £500 p.a. more than female peers. This increases to £2,500 p.a. after five years. (29)

Progression of women to senior positions is improving:

In STEM FTSE100 companies, the proportion of female directors increased from 9% to 28% from 2008-2017. (18)(19)

The proportion of new public appointments by BIS who were women increased from 23% in 2012/13 to 55% in 2014/15. (20)

In academia, the proportion of female STEMM senior managers increased from 23% in 2009/10 to 27% in 2015/16, and 15% to 20% for professors. (4)

But is slower at the very highest level:

The number of female executive directorships of STEM FTSE100 companies increased from 4 across 40 companies in 2008, to 9 across 46 companies in 2017. (18)(19)

Only 2 of 24 departmental Chief Scientific Advisor positions in government are held by women. (21)

Intersectional impacts are significant:

Women of BME backgrounds are particularly underrepresented at professorial and senior level relative to the total academic population. (4)

If the number of professors and senior managers were representative of the total academic population who are UK Nationals (both STEMM and non-STEMM), these figures would be 100%.

Proportion of senior staff compared to academic population (%)

	2009/10	2015/16
W-F Professor	**42**	**51**
BME-F Professor	**26**	**39**
W-F Senior Manager	**66**	**71**
BME-F Senior Manager	**24**	**29**
BME-M Professor	**124**	**131**
BME-M Senior Manager	**68**	**68**

The scope of change is more limited for other under-represented groups:

In 2012/13 96% of BIS public appointments were white and none had a declared disability.

The percentage of UK national STEMM academic staff who are BME increased from 8% in 2009/10 to 10% in 2015/16, compared to 14% of the UK population. (7)

WHAT'S GOVERNMENT'S ROLE?

1 A CAREERS STRATEGY THAT MEANS BUSINESS

Embed diversity and inclusion throughout a joined-up national careers strategy and do more to encourage flexible working practices and career pathways.

This would help move the dial on making science and engineering more diverse because:

- Under-representation in STEM is perpetuated by a lack of knowledge of career pathways. 41% of school children with a parent working in STEM felt encouraged to study STEM subjects, compared to 26% of those whose parents worked in a non-STEM related field, whilst half of GCSE students think the only way to attain a STEM job is through a university degree. (24) Only 0.5% of schools achieve all 8 Gatsby Good Careers Guidance benchmarks for all pupils, with provision of careers education 1 .3x higher for boys vs girls and 1.5x higher for students with high vs low 'cultural capital'. (26)
- Parental knowledge of STEM and STEM-related careers is vital to increasing students 'science capital', but is low for those from under-represented backgrounds. Students' access to informal learning, via visits to science museums etc, was with parents for 38% of students with non-graduate parents vs 54% of students with graduate parents. (22)
- Initial research suggests much science outreach funding is not specifically targeting under-represented audiences, with a large proportion directed towards schools, and only around 5% of total spending by organisations on research to understand 'what works'. (23)
- Job flexibility is a particular barrier to retention of women in STEM. Amongst academic staff, the gender gap between part-time working is larger in STEM (32% of women and 19% of men) than non-STEM subjects (48% of women and 38% of men).(4) Financial barriers, particularly the cost of childcare, are also cited as most important in preventing return to the scientific workforce (52% of respondents). (27)

We propose:

Schools and colleges need **additional funding if they are to adequately deliver on the Career Leader ambition**. Therefore, increase the budget for schools and colleges by £40m to fund 0.25 FTE (based on average teacher salary) to fulfil the role.

Evaluate activities to engage parents and teachers with STEM careers and pathways as part of the Year of Engineering, and put in place longer term funded programmes where they prove to be effective, particularly for under-represented groups.

The new **National Careers Service website should emphasise case studies of diverse STEM role models and career pathways.**

Include a specific diversity function in the National STEM Ambassador programme. Incentivise volunteers from apprenticeship schemes and SMEs, and increase monitoring of volunteer characteristics such as disability and socio-economic background, to allow channelling to where they can have the most impact.

Further support the Daphne Jackson Trust to increase retention of skilled researchers. To address inequality in retention in other STEM professions, **develop and fund retention pilots particularly in areas of shortage**, such as STEM teachers and engineers.

2 DECISIVE ACTION ON DIVERSITY DATA

Government should lead the way with national statistics and coordinate central analysis and monitoring to understand causes of under-representation, ensuring evidence can inform action taken by Government and other organisations.

This would help move the dial on making science and engineering more diverse because:

- Whilst progress has been made toward increasing collection of a wider scope of diversity data, core collection and completeness of data still varies significantly by organisation and across government activities.
- Data collection and analysis can support correct diagnosis of issues, prioritisation of intervention, and development of policies and programmes.

We propose:

Mandate the Institute for Apprenticeships to embed diversity monitoring, ensuring coverage of multiple characteristics by sector. Consider options for using funding as a lever to increase diversity where progress is insufficient.

UKRI's creation is an opportunity to build on diversity data collected by its constituent councils. **UKRI should embed diversity monitoring**, including publishing data on the number of studentships and fellowships which are held on a part-time basis, addressing any issues highlighted by evaluation of data.

The Industrial Strategy Challenge Fund aims to bring research and business together to meet major industrial and societal challenges. **Some of the next wave of funding should set out a challenge to improve diversity in STEM.**

To build on successful science outreach work by many organisations, **The National Centre for Coordinating Public Engagement should be funded to take a lead role in collating an evidence base of what works for engaging under-represented groups in STEM**, and provide clear guidance for organisations designing evidence-based activities.

Increase transparency of data provided on the government 'Ethnicity facts and figures' website, with breakdown by sector and intersectional characteristics.

About CaSE

CaSE is the UK's leading independent advocate for science and engineering. Our mission is to ensure that the UK has the skills, funding and policies to enable science and engineering thrive. We represent over 110 scientific organisations including businesses, universities, professional bodies, and research charities as well as individual scientists and engineers. Collectively our members employ 380,000 people in the UK, and our industry and charity members invest around £43bn a year globally in R&D.

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* Acronyms in the document are standardised where possible but otherwise represent difference in usage by data sources

To view the above reports go to: www.sciencecampaign.org.uk/engaging-with-policy/evidence-base/evidence-base-diversity.html

To view an online version of this please go to: www.sciencecampaign.org.uk/resource/diversity2018.html
To read all our recent policy reports please got to: www.sciencecampaign.org.uk/our-work/latest-reports.html

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CaSE is committed to improving its own diversity

In our 2008 report, CaSE committed to improving the diversity of its governing bodies within the term of office. Since then, there has been significant improvement in the gender balance:

	CaSE staff	Board of Directors	Advisory Council	
2008	2/4	2/15	11/47	
2014	2/3	7/15	10/40	
2018	4/6	6/15	5/12	(Female/Total)

CaSE will continue to monitor and take action to improve the diversity of its governing bodies across a range of characteristics..

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