



TALENT 2050: ENGINEERING SKILLS AND EDUCATION FOR THE FUTURE

PHASE 1

A REVIEW OF EXISTING STUDIES AND
WORKSHOPS AROUND THE UK ON CURRENT AND
FUTURE ENGINEERING SKILLS DEVELOPMENT

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I Introduction

Much has been done in recent years to stimulate the supply of trained engineers into industry. Engineering UK and others have invested substantially in encouraging a larger and wider group of young people to enter the profession. While such initiatives have seen their successes, these have not been sufficient for us to be able to look forward to the middle of this century confident in the knowledge that there will be the right number of employees armed with the right skills and attributes to enable our engineering industries to thrive.

The number of replacement employees needed alone is a challenge. To this we must add potential further difficulties in recruiting from overseas. Plus the UK's poor productivity and the desire of politicians and others to rebalance our economy towards production and away from services. And this is before we address the enormous changes and opportunities in the form of AI and materials and other developments that our engineering industry is likely to encounter in the years ahead. In this context we need to explore, identify and implement ways to increase the provision of well-educated, well-trained and well-motivated entrants into engineering.

The year 2050 seems a long way off. However, it takes 20 years to take a generation from early years to graduation. We therefore have just 10 years to identify what works and what we need to put in place. While this may not seem a "burning platform", given that we have spent 40 years failing to address these issues successfully, we must act now to develop the evidence, apply the radical thought and take the necessary steps if we are to have a hope of meeting this complex, but potentially highly rewarding, challenge.



WE NEED TO EXPLORE, IDENTIFY AND IMPLEMENT WAYS TO INCREASE THE PROVISION OF WELL-EDUCATED, WELL-TRAINED AND WELL-MOTIVATED ENTRANTS INTO ENGINEERING.

Professor David Phoenix

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| Executive Summary

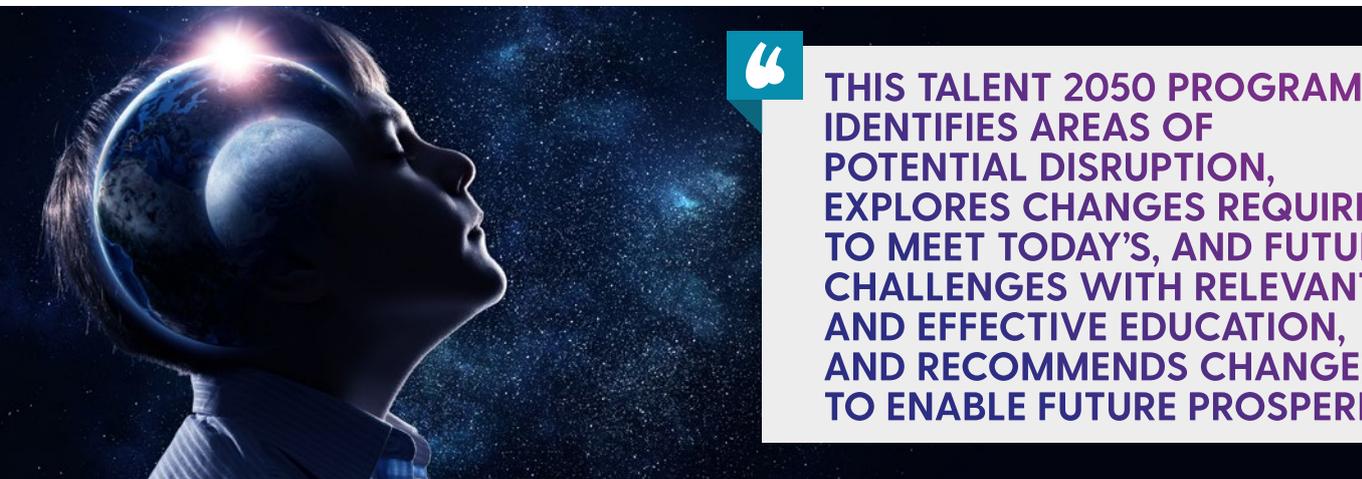
Ensuring global competitiveness

For Britain to compete globally in the middle of this century it needs high-level engineering skills within a diverse workforce, ready to lead through unprecedented disruption and global competition.

This Talent 2050 programme identifies areas of potential disruption, explores changes required to meet today's, and future, challenges with relevant and effective education, and recommends changes to enable future prosperity.

A review of existing studies and NCUB workshops around the UK have set a baseline for current and future engineering skills development. Input from those in or using engineering skills, including early career engineers, looked at the changes required to meet the needs of a dramatically changing society with skills for the next industrial revolution, to serve an ageing population within dramatic environmental changes.

A summary of the results are published here, and will inform further exploration in workshops and strategic roundtables. A final report, with recommendations, will be published early in 2019.



THIS TALENT 2050 PROGRAMME IDENTIFIES AREAS OF POTENTIAL DISRUPTION, EXPLORES CHANGES REQUIRED TO MEET TODAY'S, AND FUTURE, CHALLENGES WITH RELEVANT AND EFFECTIVE EDUCATION, AND RECOMMENDS CHANGES TO ENABLE FUTURE PROSPERITY.

| Method

The baseline Rapid Evidence Assessment (REA) for STEM (including digital) skills focused on current supply and potential future demands using 40 sources.

Workshops were held in Edinburgh, Sunderland and London and included senior individuals from public and private sectors, trades unions, education and professional bodies, early career stage professionals and researchers.

Findings

Ensuring global competitiveness

Views from the workshops aligned with the themes emerging from the REA, highlighting that known issues are not progressing quickly and meaningfully. There is slow progress towards the dramatic change that younger participants assumed to be a given.

Broader Skills

Defining STEM and/or digital skills remains a challenge. For employment, necessary core technical skills are needed but also a broader skillset required for practical employability, while a wider 'digital/STEM literacy' will be beneficial amongst the public and society. Our workshops identified these broader skills (to make technically skilled people employable) as the most significant missing elements in existing education, predicting a greater need in the future.

STEM initiatives have helped increase the supply pipeline from education, but demographic trends and migration effects outweigh those positive impacts. While very significant barriers and bottlenecks persist, the continuing under-representation of women, ethnic minorities and the disabled in engineering was highlighted by the workshop participants.

Recruitment bottlenecks and barriers

Recruitment and selection processes are not optimised to enhance diversity. In particular fixed qualification requirements, such as A-level physics and Chartered Engineer registration, are seen as a barrier.

The supply of STEM and digital skills via schools is not meeting rising demand. More focus is needed on retraining staff to encourage intersectoral mobility, transferring skills from different parts of the engineering sector and meeting the challenge of recruiting talent from outside engineering.



THERE IS POTENTIAL IN A NUMBER OF INITIATIVES TO OVERCOME PIPELINE PROBLEMS, BUT MORE RETRAINING FOR THE EXISTING WORKFORCE IS NEEDED.





Intersectoral mobility

Intersectoral mobility and recruitment will be more important if the UK is perceived to be a less welcoming work or study destination post-Brexit.

Workforce planning is not practised widely in the UK and a lack of centralised thinking may impact our ability to define which skills will be required. However, the expected extent of disruption may be greater than catered for in conventional planning approaches.

Employability and technical skills

The message is clear - a range of contemporary ('21st Century') employability skills are necessary, along with technical STEM knowledge and skills. More people with technical qualifications, but unemployable due to a lack of soft skills will not drive the sector forward, nor enable organisations to benefit from technological advances in a globalised economy. 'Digital literacy' (and to a lesser extent environmental literacy) is gaining momentum to complement core technical and digital skills of STEM professionals.

Educational frameworks, and their accreditation, should include these employability skills. There is potential in a number of initiatives to overcome pipeline problems, but more retraining for the existing workforce is needed. Different routes into engineering might provide these skills more effectively. And, apprenticeships might only be relevant to one particular role and/or employer rather than more transferable 21st Century skills.

Major change needed

For engineering to be ever more important to the economy, major changes are needed including a wider range of people with the appropriate skills. The 'school to apprenticeship or university' route for young people, even if changed to more effectively develop the skills outlined here, will not address the necessary change quickly enough. In addition to changing attitudes and subject choices of young people we need to consider the attraction of those already in work and how reskilling can be achieved.

Future skills for disruptive change

The next phase of the Talent 2050 programme will look at how future possibilities will shape our skills needs, both for the engineering sector, and for engineering-type skills across sectors and society. The final report of Talent 2050 to be published early in 2019 will make recommendations.

I Evolving Recommendations and Future Themes

Barriers and Bottlenecks

1. To drive a more diverse workforce and avoid skills shortages engineering needs to reach beyond existing STEM employees.
2. Consider a more inclusive approach where recruitment or enrolment (including professional registration) is based on the potential to gain the right skills rather than because they haven't already obtained them.
3. The Institute for Apprenticeships and Government should reconsider the requirement for employers to take apprentices to Level 2 in English and Maths by the end point assessment, whilst still encouraging greater literacy and numeracy skills, so employers can be actively encouraged to develop young people who display practical talents.

Attracting and supporting intersectoral mobility

4. Ensure upskilling and reskilling are fully supported for those already in work, whether within the sector or bringing complementary skills through intersectoral job mobility. This will need to be regionally tailored and applicable to SMEs as well as major corporations.
5. Digital skills, including AI, and environmental protection provide the foundation for future change and need to be fully integrated, with regional support, in an industrial strategy that embraces interdisciplinary working.

Next Steps

Themes to be developed in the next phase:

- How different approaches to education – e.g. work-based learning – can tackle broader employability skills
- Filling in the education gaps – network tools for information and development – and at what stage, in education or in employment
- How interdisciplinary working will require breadth, but with the tools to go deeper when necessary
- How to develop better people skills and understand greater product personalisation
- Building adaptability and capacity to deal with disruptors such as technology in materials, AI and distributed vs. centralised manufacturing models
- How to identify and recruit on potential rather than qualifications to achieve a more productive and diverse workforce.

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Phase 1 - A full research pack on Phase 1 is available from info@ncub.co.uk.

A final Talent 2050 report will be published early in 2019.





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