

semta<sup>®</sup>

# ENGINEERING SKILLS FOR THE FUTURE

providing a  
clear picture  
to encourage  
opportunities  
to progress  
and achieve  
great things in  
engineering



## FOREWORD



**When it comes to engineering careers, there's so much to shout about. Ours is a sector where you genuinely can go as far as your talents take you, from the shop floor to the boardroom. Indeed, Semta's own Chairman, Allan Cook CBE, started out as an apprentice and three of Siemens' Managing Directors in the UK did too.**

As well as unparalleled opportunities to progress and achieve great things, an engineering career offers the very real prospect of financial reward. This is as true for those at the start of a career in our sector as it is for those whose careers are more established. So while a chartered engineer can expect to earn £63,000<sup>1</sup> per year on average, engineering graduate schemes typically offer salaries in excess of £25,000<sup>2</sup> and engineering apprenticeships offer an average starting salary of around £14,000<sup>3</sup> – and that is higher for advanced (Level 3), higher (Level 4) and the new degree apprenticeships (Level 6).

Despite offering that sought-after combination of career progression, financial reward and job satisfaction, however, our sector is facing a serious skills shortage.

With one estimate putting the need for new science, engineering and technology professionals at over 800,000 by 2020, we have a lot of work to do to avert it.

We all know that careers information, advice and guidance in schools needs to improve – and the government is taking steps to try to secure the needed improvement – and we all know that still more needs to be done to ensure that vocational and technical skills are afforded the same prestige and status as academic skills.

However, we can't afford to sit on our hands and wait for government, young people, parents, teachers and other groups to catch up. Those of us working in engineering have a crucial role to play in demonstrating, first hand, just how rewarding and thrilling a career in our sector can be.

That's why Semta has undertaken research into how those of us already in the sector – both engineers and non-engineers – promote engineering to those who are considering joining us. Some of the findings are surprising, and some less so. But all of this research, and the report you are reading now, will help to provide a clearer picture of what we're doing well, what we're doing less well, and what more we can do ourselves to meet our sector's skills needs.

*Ann Watson*

**Ann Watson**  
Chief Executive  
Semta

## FOREWORD



**According to the Institution of Engineering and Technology, only 9% of the engineering workforce is female.**

In the same vein, EngineeringUK reports that only 6% of registered engineers and technicians are women; and according to official government figures, females make up a paltry 4% of engineering apprenticeships at the beginning of apprenticeship programmes.

Employers from across the sector are devoting time, money and resources to correct this longstanding imbalance. Atkins, the global engineering company I have the privilege to chair, strives to give equal opportunities to men and women and to be flexible when it comes to things like parental leave and flexible working hours. There are a number of cross-sector initiatives, such as the WISE (Women In Science and Engineering) Ten Steps Campaign, who work hard to inspire women to consider a fantastic career in engineering.

At Semta, where I am also their Chairman, we are continuously tackling the diversity and inclusion challenge within the advanced manufacturing and engineering sector and always seek to showcase the abilities of the female engineering talent the sector holds. Our annual Semta Skills Awards is the best place to highlight these opportunities and recognise the talent we have in our engineering companies. I am also

proud to chair the Royal Academy of Engineering's Diversity and Inclusion Leadership Group, which is an industry led group trying to understand, and find solutions for, the challenges we face in attracting females to consider engineering as a rewarding career.

Despite these efforts by employers and sectoral bodies the numbers of women considering a career in engineering remains stubbornly low. This must change! Already, as I write this introduction, we have a serious shortage of engineers in our sector. We simply cannot afford to ignore the potential contribution of more than 50% of the population to our sector. With 64% of engineering employers saying a shortage of engineers in the UK is a threat to their business, we have to do more to increase diversity and inclusion within our engineering population.

Although this research wasn't conducted with the explicit aim of identifying disparities in how the genders perceive engineering and in their motivations for getting into the sector, it is clear that there were key differences, and that these need to be properly taken into account by employers, educators, engineers and policymakers when talking to women and girls about considering a career in engineering.

We all have a part to play in helping to increase diversity and inclusion in our industry, so I hope that once you've read this report you will not only absorb the lessons to be found in the research but really think about what you can do personally to demonstrate to the girls and women in your life that engineering is not just for boys! Yes, we need a strong, coordinated plan of action that reaches across the whole sector – but ultimately, we're all individuals, and it's the collected efforts of all those involved in engineering that will ensure we resolve this problem for good.

*Allan Cook*

**Allan Cook CBE D.Sc.**  
Chairman  
Semta

SECTION 1

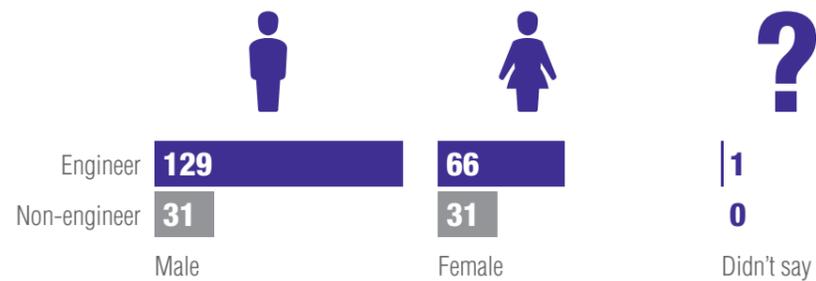
# THE RESPONDENTS

The purpose of this report is to identify differences in how engineers and non-engineers promote the sector they work in to those around them, and to suggest practical measures which could be enacted in order to help the sector to better promote itself and become more attractive as a destination to those who might be considering a career in it. We also aim to find out whether young people who are in direct contact with an engineer are more predisposed to becoming one themselves.

We opened up this survey to non-engineers to see what more needs to be done to help people who work in the sector in non-engineering roles to understand what best motivates possible new engineers to enter the sector – and to see whether there’s anything practising engineers can do to help their non-engineer colleagues to be better prepared when talking to friends and family about an engineering career.



**TABLE 1 – SUMMARY OF RESPONDENTS**

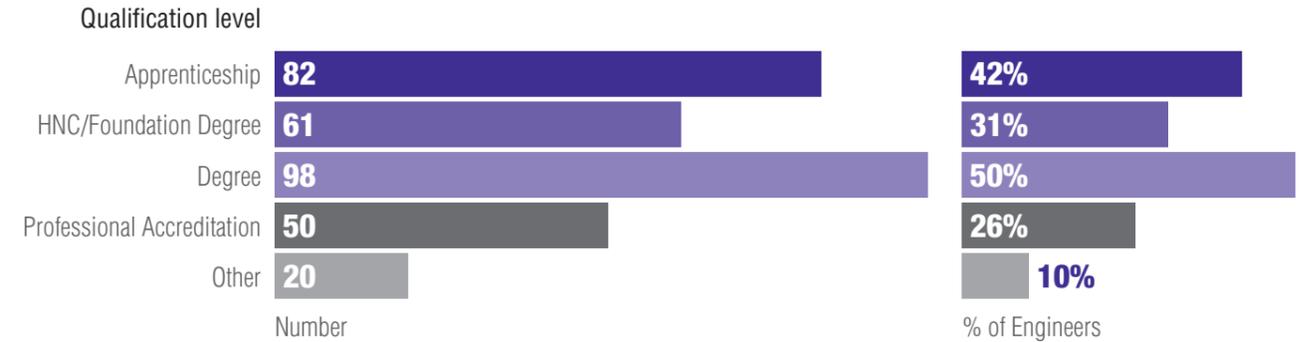


The sample of 196 engineers that responded to the survey is not a representative snapshot of the sector as a whole. Older engineers are relatively under-represented and those with degrees are relatively over-represented.

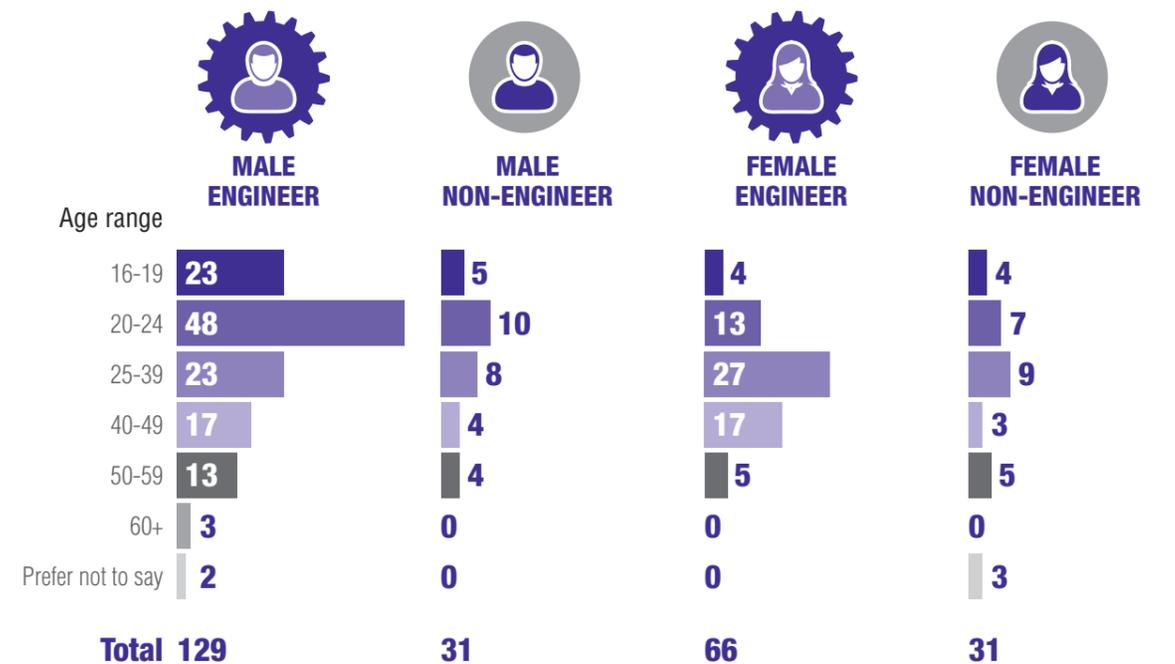
All of the respondents work in the engineering sector – the ‘non-engineer’ category includes all employees who are not in engineering roles.

Note that some respondents hold more than one qualification as detailed in Table 2, therefore the total is greater than the number of engineers who responded.

**TABLE 2 – ENGINEER QUALIFICATIONS**



**TABLE 3 – ENGINEER AND NON-ENGINEER AGES**

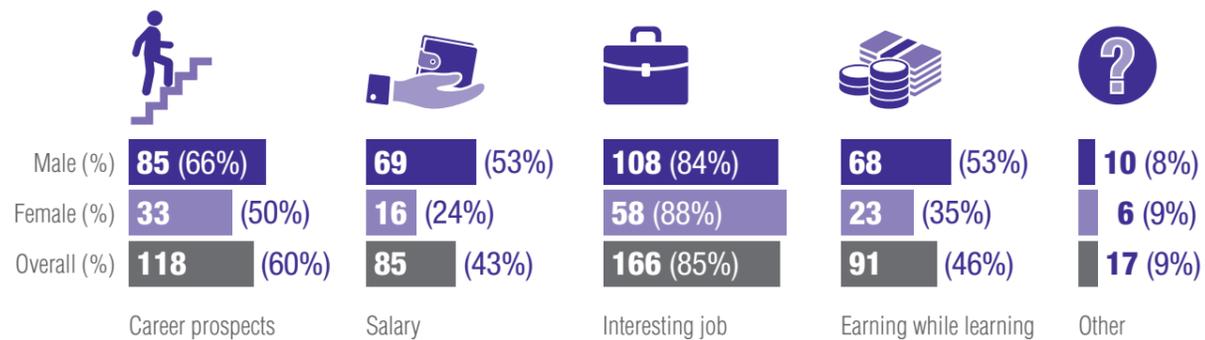


SECTION 2

# REASONS FOR GETTING INTO ENGINEERING

Semta asked the engineers who responded to this survey what their main reasons were for embarking upon an engineering career. The respondents were then asked how they promote engineering as a career to people they know who are considering getting into the sector.

TABLE 4 – REASONS GIVEN FOR ENTERING ENGINEERING



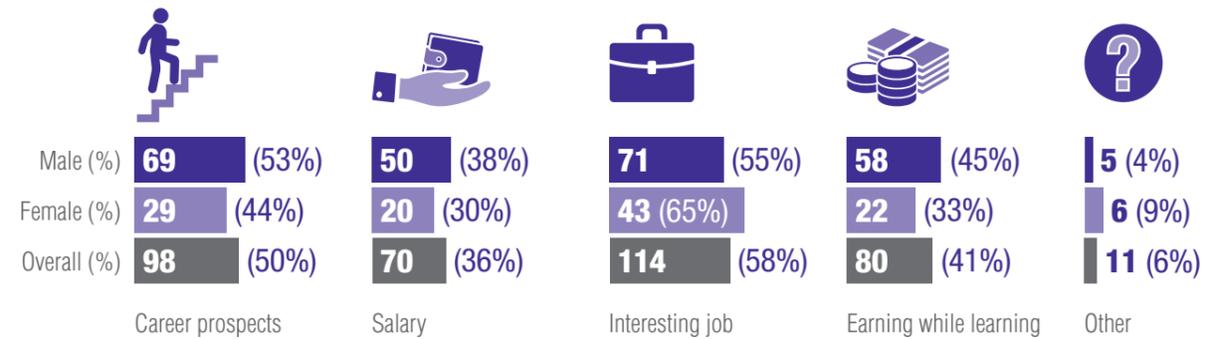
The main reason given by engineers for embarking upon an engineering career was that they thought it would be an interesting job. A slightly higher proportion of female engineers gave this as a reason than did male engineers – this may be a surprising finding given that a common reason given by girls for not liking STEM subjects at school is that they find them “boring”. However, this was comfortably the most given reason by both male and female respondents. It’s welcome that the prospect of challenging and interesting work

features heavily in the sector’s promotional materials – on the basis of the responses to our survey, it’s a message that is working.

The largest disparity between the genders is in financial reward, with a much higher proportion of male engineers who responded citing salary and the ability to earn while learning (in the case of an apprenticeship) than female. However, the latter is perhaps due to the female respondents almost all being qualified to degree level and thus not having gone through

the apprenticeship route at the same rate as the male respondents. It is worth noting that recent research by Deloitte has shown that the average starting salaries for male and female engineering and technology graduates are the same<sup>4</sup>. Nonetheless, research has found that men are more interested in salary in general than are women – the UK Graduate Barometer<sup>5</sup> shows that in general, for graduate males, money is more important than company image or career satisfaction.

TABLE 5 – REASONS FOR ENCOURAGING PEOPLE TO ENTER ENGINEERING (ENGINEERS)

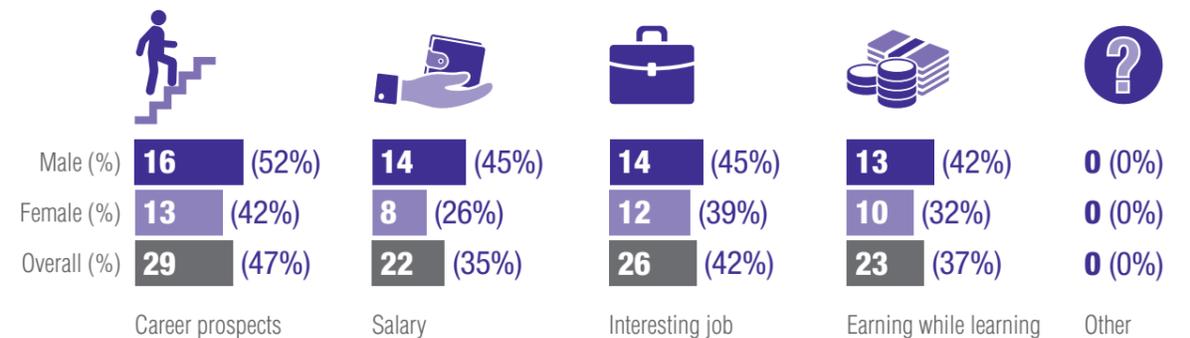


As might be expected, there is some correlation between the reasons engineers gave

for entering the sector and the reasons they have given to others to follow in their footsteps – the

the prospect of an interesting job comes out on top in both cases.

TABLE 6 – REASONS FOR ENCOURAGING PEOPLE TO ENTER ENGINEERING (NON-ENGINEERS)



The greatest disparity in how engineers and non-engineers promote the sector to prospective entrants is in seeing the sector as offering interesting work. Engineers are proportionally more likely to use this as a reason than non-engineers. Otherwise, there is little difference in how engineers and non-engineers promote engineering as a career.

It could be that non-engineers – even those who work in and with the engineering sector, as in the case of our survey respondents – lack information on what an engineering job will actually entail. It could also be that they have preconceptions about what an engineering job

looks like which don’t match up to the reality of the work.

Given that the prospect of interesting work was a major draw to the sector for most of the engineers who responded to our survey, and given that it is also one of the key points they use when encouraging potential new recruits to the sector, better informing non-engineers working within the sector about how interesting an engineering career can be is one way to help to spread positive and convincing messages about the sector. Our research shows that almost half (46.6%) of the advanced manufacturing and engineering workforce

comprises managers, professionals, administrative, sales, customer service and other such staff, so if the sector can ensure these staff are equipped with the right messages, we could see a huge boost in the numbers of young people getting into the sector as engineers.

This is particularly important in the case of female would-be entrants – the engineering sector continues to have a problem with its gender gap, and the messages being used by engineers around financial rewards do not resonate as strongly with female entrants to the sector.

SECTION 3

# WHO THE SECTOR ENCOURAGES TO GET INTO ENGINEERING

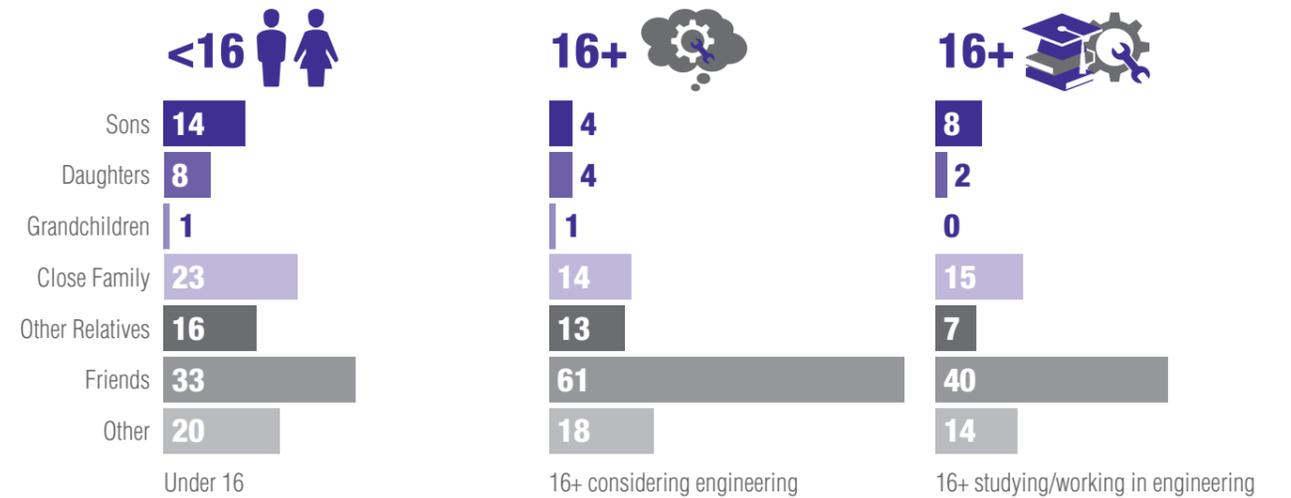
A majority of both engineers and non-engineers who responded said they had encouraged family and/or friends to pursue a career in engineering, although the proportion of engineers doing so was higher than the proportion of non-engineers – as may be expected.

**TABLE 7 – HAVE YOU ENCOURAGED ANY OF YOUR FAMILY OR FRIENDS TO GO INTO A CAREER IN ENGINEERING?**



By far the most popular group of people encouraged into engineering by those already in the sector are their friends.

**TABLE 8 – WHO THE SECTOR ENCOURAGES INTO AN ENGINEERING CAREER**



Those working in the sector say they have had the greatest success in recruiting close family members and friends to engineering excluding sons and daughters. Relatively few respondents said that they had managed to encourage more than one other person to get into engineering. The sector needs to reflect on why this is the case – why should we be happy to attract close family members but not our own sons and daughters?

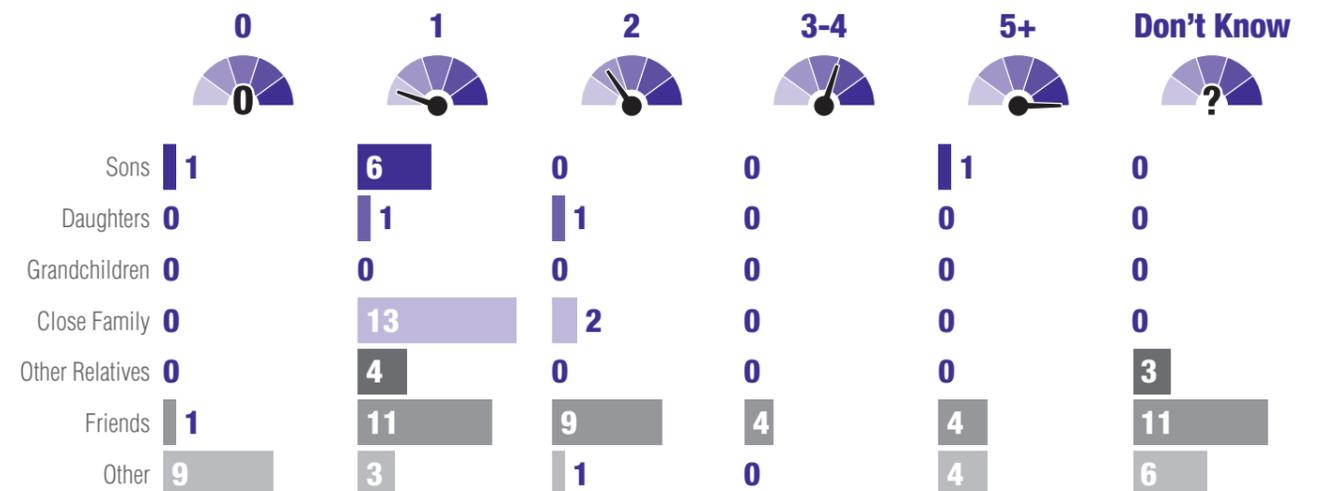
However, the conversion rates for those groups are good – the number of respondents who said they had encouraged other close family members to get into engineering who were already in the sector, at 15, is exactly the same as the number who said those they had encouraged had actually gone into the sector.

The same is true for the number who said they had encouraged friends and those who said

they had had friends go into engineering, both 40.

People listen to their friends for job advice, and young people are perhaps more inclined to listen to the advice of family members who are not their parents. If you have a niece or nephew who has the aptitude to go into engineering and who is showing an interest – give them all of the encouragement that you can!

**TABLE 9 – NUMBERS ENCOURAGED INTO AN ENGINEERING CAREER (16+, WORKING IN/STUDYING ENGINEERING)**



**SECTION 4**

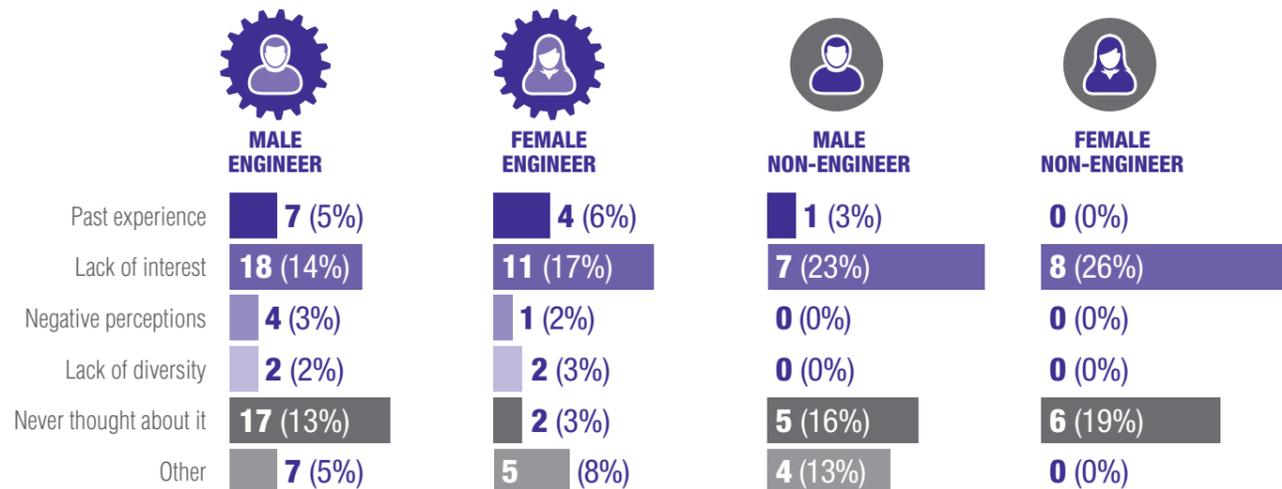
# REASONS FOR NOT ENCOURAGING OTHERS

As might be expected, a higher proportion of engineers than non-engineers who responded to our survey said that they had encouraged others to get into the sector. However, as the table in the previous section shows (Table 7), more than half of the non-engineers who responded said they had encouraged family and friends to do so.

Comparing the reasons given for not encouraging family and friends into the sector doesn't throw up many disparities – a perceived lack of interest in the sector is the top reason given by both engineers and non-engineers. Interestingly, a much lower proportion of female engineers gave the reason that they simply hadn't thought about it – although the sample number is low, this could indicate that female engineers are on the whole relatively more conscious of their role in encouraging new talent to get into the sector.

Hearteningly, negative perceptions of the sector were given as a reason for not encouraging others to enter the sector by a relatively low proportion of respondents to our survey. It seems that on the whole, those working in the sector either as engineers or in other roles do not expect those around them to think negatively about the sector.

**TABLE 10 – REASONS FOR NOT ENCOURAGING OTHERS TO GO INTO A CAREER IN ENGINEERING**



**SECTION 5**

# ROUTES INTO THE SECTOR

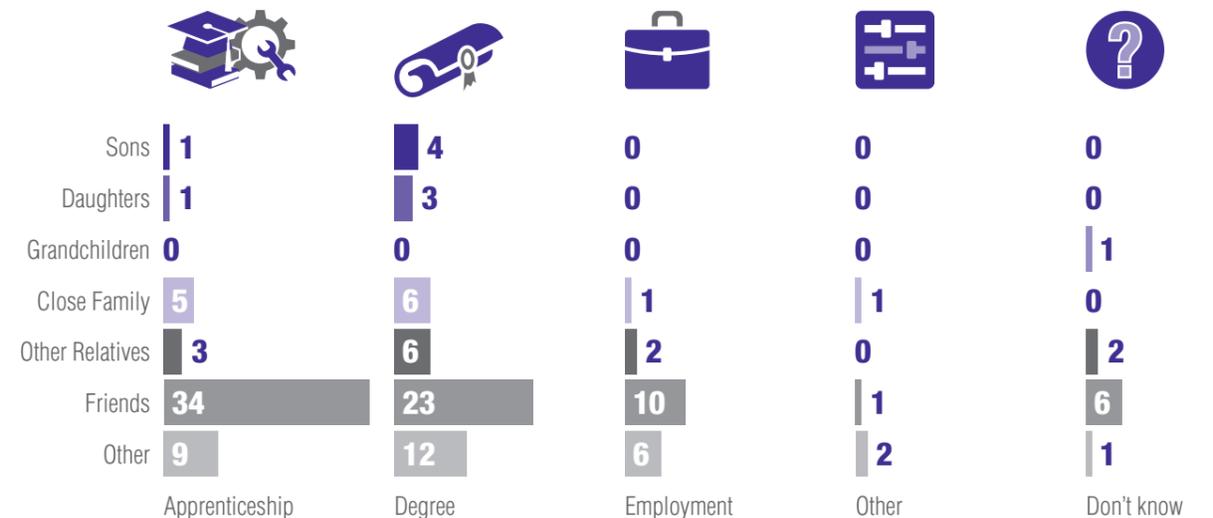
Semta asked survey respondents which routes into the sector were being considered by those they knew who were thinking about an engineering career.

The responses show one glaring similarity – when it comes to friends, apprenticeships are the most popular choice. This perhaps reflects the esteem in which those working in the sector hold engineering apprenticeships – some 26% of those working within the sector have undertaken an apprenticeship<sup>6</sup>, the sector has a long and proud tradition of offering apprenticeships, and they are generally seen (within and outside of the sector) as rigorous and high-quality.

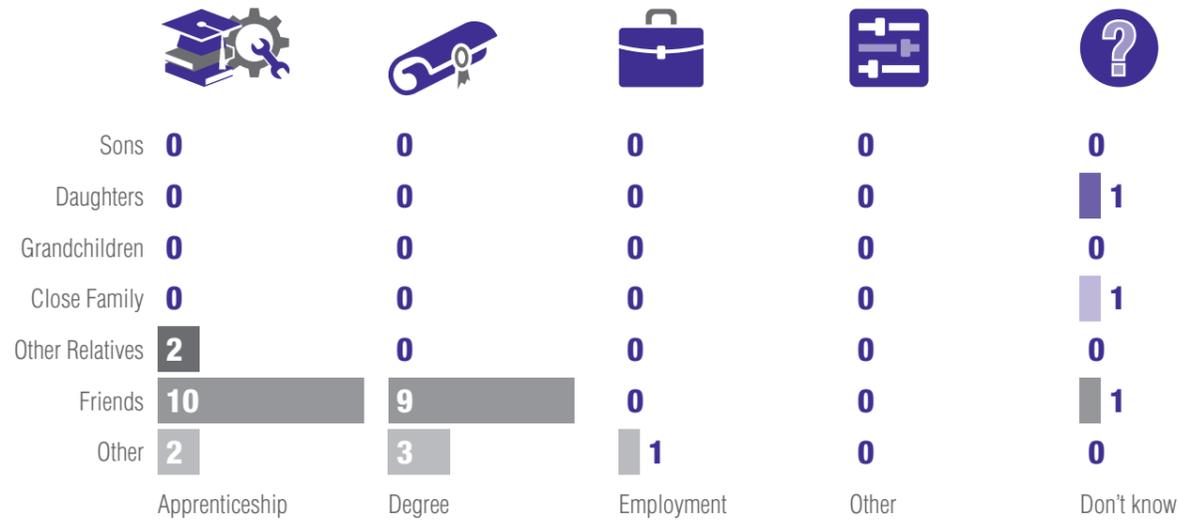
Engineering degrees were the second most popular route for friends of both engineers and non-engineers to consider. Engineering degrees are generally perceived to offer strong transferrable skills and engineering graduates are generally in demand for their numeracy and problem-solving skills.

The survey didn't ask about degree apprenticeships – although the numbers of starts on all standards, including engineering standards, have been low to date, the introduction of the apprenticeship levy in April 2017 may see more engineering employers beginning to offer them as a way of getting back what they're paying into the pot. However, the sector needs to question why the numbers of degrees being undertaken by sons and daughters is higher than the numbers undertaking apprenticeships – does the sector need to do more to destigmatise apprenticeships amongst its own employees?

**TABLE 11 – LIKELY ROUTES INTO THE SECTOR OF THOSE AGED 16+ CONSIDERING ENGINEERING (ENGINEERS)**



**TABLE 12 – LIKELY ROUTES INTO THE SECTOR OF THOSE AGED 16+ CONSIDERING ENGINEERING (NON-ENGINEERS)**

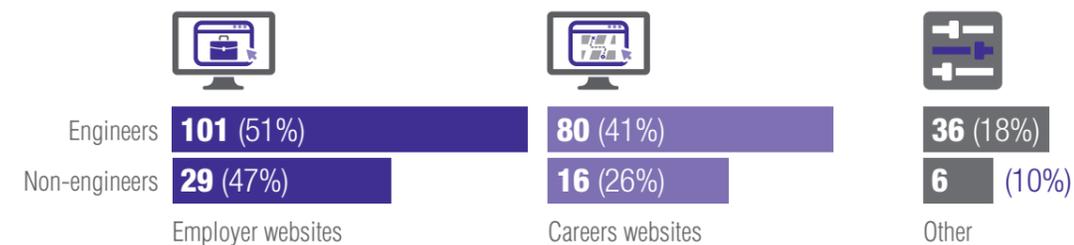


Semta also asked which sources of information respondents recommended would-be entrants into the sector looked at when making a decision. Employers' websites were more popular than careers websites with both engineer and non-engineer

respondents – although the gap is narrower between the two cohorts for careers websites than for employer websites. It could be that employer websites are more popular within the sector because our employees are happy to recommend their own employers.

Not all respondents said they were using any of these sources, and some said they were using more than one, so there is patchiness of awareness of these sources of information within the sector which needs to be addressed.

**TABLE 13 – RECOMMENDED SOURCES OF INFORMATION ABOUT ENGINEERING CAREERS**



NOTE: Sum is not 100% as not all respondents selected any of these options.

**SECTION 6**

# CONCLUSIONS

There are some surprising and some less surprising findings that emerge through this research. All of the findings will hopefully provide food for thought for both those working within the engineering sector and for their employers.

We all have a part to play in promoting our sector as a great place to work, but as we have seen different messages are effective coming from different sources and being delivered in different ways.

Semta has made some recommendations here, which we hope, having considered the findings of the research underpinning this report, the whole engineering sector will take on board and use when developing careers resources and when talking to family and friends about what a career in our sector can offer them.

FINDINGS	ACTIONS
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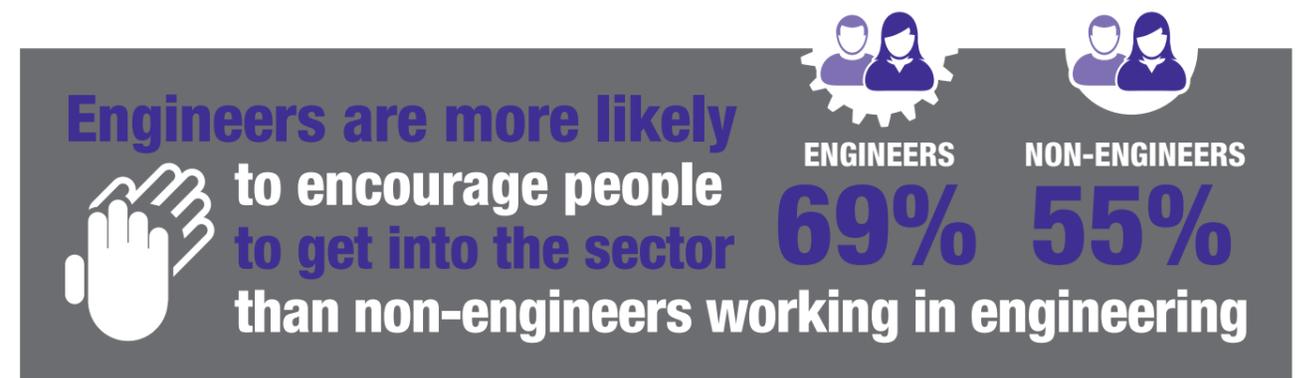
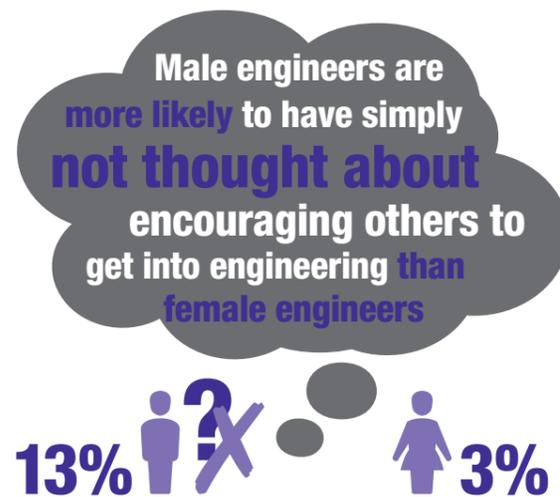
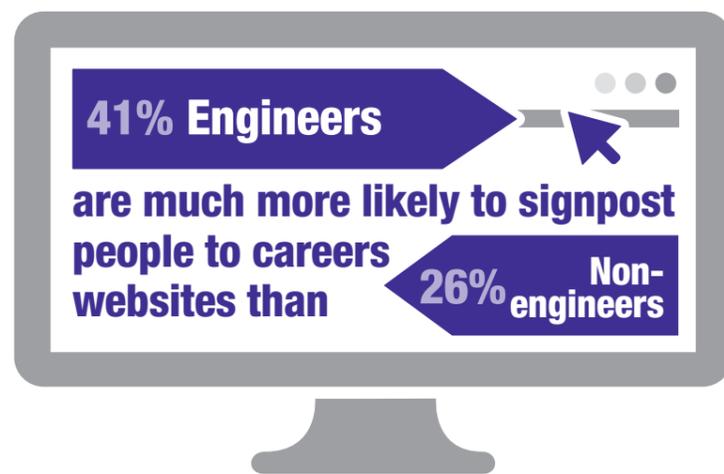
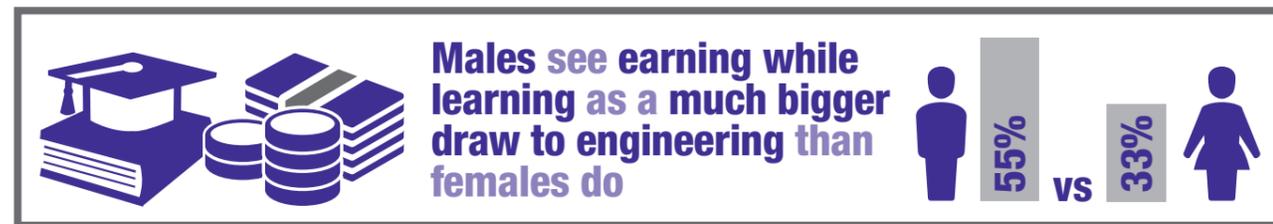
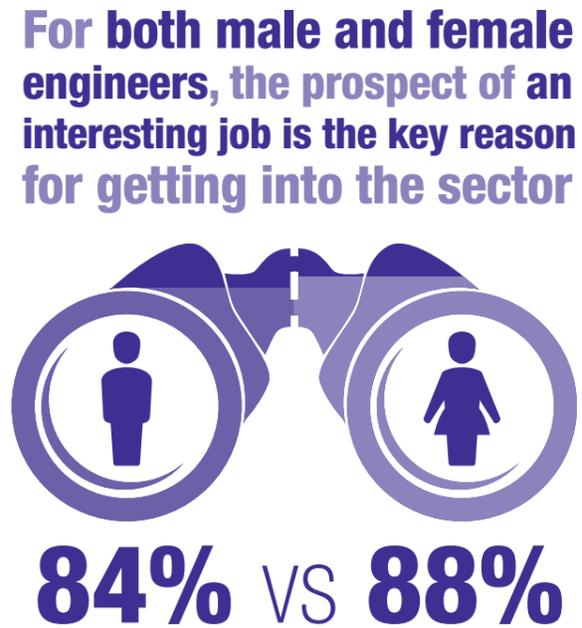
<b>Different messages work on male and female would-be entrants.</b>	Engineers and non-engineers need to be mindful of the findings outlined in this paper and tailor their messages to male and female would-be entrants accordingly. This is especially important in the case of female engineers, who are well placed to promote engineering as a sector offering interesting work to female would-be entrants, but male engineers must be aware of the financial interests male potential recruits have in getting into the sector. It's incumbent upon Semta and engineering sector organisations to ensure the right messages are being formulated and disseminated.
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<b>Apprenticeships, degrees and jobs are all great routes into engineering for our sector to promote.</b>	We shouldn't be talking down any of the potential routes into engineering, because as shown in this report, different would-be entrants to the sector consider different routes. A 'horses for courses' approach should be taken and would-be entrants should be encouraged to find out more about the option that is right for them. This is particularly important given the continued perceived partiality and bias towards the university route that exists in schools careers advice – many engineering sector organisations already produce excellent careers advice materials, e.g. our own careers pathway map, available at <a href="http://semta.org.uk/careers">http://semta.org.uk/careers</a>
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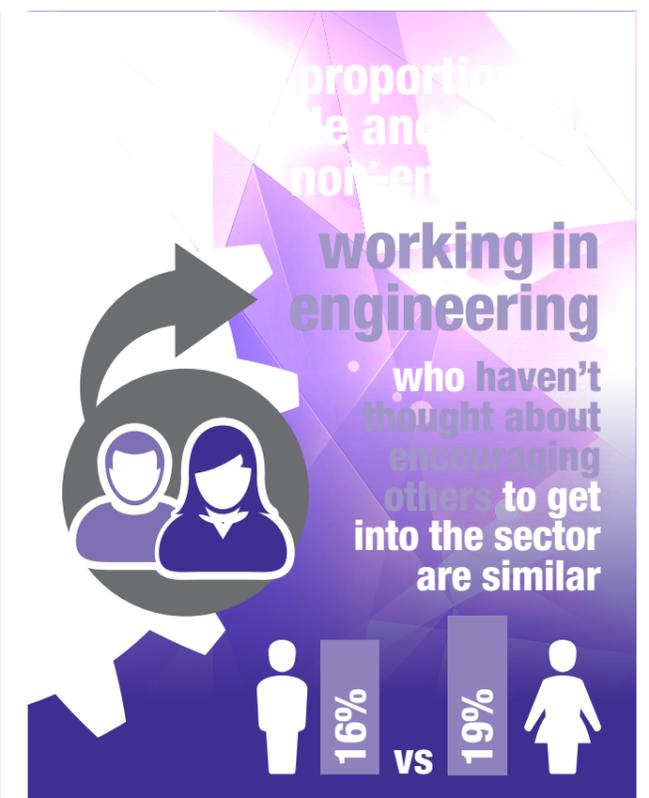
<b>Employers' own websites are the most cited source of information out there.</b>	It's crucial that employers ensure their own careers pages offer an upbeat, interesting and exciting vision of what an engineering career looks like. Given that different messages work best on boys and girls, it's important that a range of messages are used, perhaps through case studies. It's down to Semta and other organisations to coordinate efforts to show employers that this is the case – and it's then for employers to ensure their own websites are well promoted.
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<b>We need to more effectively promote our sector's general careers websites.</b>	Although employers' websites are more cited than careers websites, especially by non-engineers, that doesn't mean we should discount the value of general engineering careers websites. There is a wealth of information out there; we need to do better as a sector in understanding what is available and signposting people towards it. Semta, as a body representing the skills interests of all engineering employers, can act as the organisation which signposts people in this way.
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<b>The engineering 'gender gap' exists in who we talk to about our sector.</b>	Given that just 12% of those working in engineering are female <sup>7</sup> , and given that just 3% of engineering apprenticeships are started by females <sup>8</sup> , it's vital that we don't discount any of the people around us as potential engineers. We shouldn't assume that girls and women are disinterested in our sector – it may well be that the sector has simply not been promoted to them in the right way. The research in this paper shows which messages work better on girls and women – it's incumbent upon all of us to get out there and use those messages, while Semta will continue to promote engineering as a female-friendly sector, and share examples of good practice on recruiting females wherever and whenever we can.
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**Apprenticeships are the most commonly expected route into engineering for friends of both engineers and non-engineers**



## CONTACT US



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