



Evaluation of the Cyber Security Postgraduate Bursaries Scheme

Department for Digital, Culture, Media and Sport (DCMS)

September 2020

Fieldwork period January – March 2019
Report completed July 2019

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EXECUTIVE SUMMARY

The Department for Digital, Culture, Media and Sport (DCMS) appointed RSM UK Consulting LLP (RSM) to evaluate its cyber security postgraduate Bursaries Scheme to find out:

- If the Scheme is an effective form of government intervention that succeeds in its aim of getting candidates into cyber security through National Cyber Security Centre (NCSC) accredited MSc programmes
- What impact it has had on candidates getting cyber security roles and whether they would have otherwise been able to undertake these studies

This report summarises the findings of this evaluation. It is based on a mixed methods approach including: desk research; surveys of bursary beneficiaries and those who applied for a bursary but were unsuccessful (control group);¹ consultations with DCMS representatives, representatives from the participating Higher Education Institutions (HEIs) and sector representatives; and development of beneficiary case studies.

In line with rules around disclosure of funding amounts under the National Cyber Security Programme some financial information, including assessment of value for money, is not included in this published version.

Why was government intervention needed?

Current government policy² has a clear aim of developing the UK cyber security sector. However, a number of market failures exist, specifically:

- **Cyber security skills gaps:** Research highlights the need for high-level skills³
- **Lack of awareness of career opportunities⁴ and negative perceptions⁵ of the sector:** Research indicates this reduces the number of people, particularly women, choosing to enter cyber security⁶
- **Access to finance:** Research into widening participation in higher education identifies finance as a barrier for underrepresented groups⁷

¹ TO ENCOURAGE PARTICIPATION RESPONSE TO THE CONTROL GROUP SURVEY WAS INCENTIVISED WITH A £50 RETAIL VOUCHER FOR THE FIRST 100 RESPONDENTS

² HM GOVERNMENT (2016) NATIONAL CYBER SECURITY STRATEGY 2016 – 2021 [ONLINE]. AVAILABLE AT: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/567242/national_cyber_security_strategy_2016.pdf [ACCESSED 08/05/19]; HM GOVERNMENT (2017) UK DIGITAL STRATEGY. [ONLINE]. AVAILABLE AT: <https://www.gov.uk/government/publications/uk-digital-strategy/uk-digital-strategy> [ACCESSED 08/05/19]; AND HM GOVERNMENT (2018) INITIAL NATIONAL CYBER SECURITY SKILLS STRATEGY: INCREASING THE UK'S CYBER SECURITY CAPABILITY - A CALL FOR VIEWS. [ONLINE] AVAILABLE AT: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767515/Cyber_security_skills_strategy_2_11218.pdf [ACCESSED 01/04/19]

³ IPSOS MORI (2018) UNDERSTANDING THE UK CYBER SECURITY SKILLS LABOUR MARKET. [ONLINE]. AVAILABLE AT: [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/767422/UNDERSTANDING_THE_UK_CYBER_SECURITY_SKILLS_LABOUR_MARKET.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767422/UNDERSTANDING_THE_UK_CYBER_SECURITY_SKILLS_LABOUR_MARKET.PDF) [ACCESSED 08/05/19]

⁴ ECORYS (2016) DIGITAL SKILLS FOR THE UK ECONOMY. [ONLINE]. AVAILABLE AT: [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/492889/DCMSDIGITALSKILLSREPORTJAN2016.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492889/DCMSDIGITALSKILLSREPORTJAN2016.PDF) [ACCESSED 08/05/19]

⁵ KASPERSKY LAB (2017) BEYOND 11%: A STUDY INTO WHY WOMEN ARE NOT ENTERING CYBERSECURITY [ONLINE] AVAILABLE AT: <https://d1srlrzdmpew.cloudfront.net/wp-content/uploads/sites/86/2017/11/03114046/Beyond-11-percent-Futureproofing-Report-EN-FINAL.pdf> [ACCESSED 15/02/2019]

⁶ CENTRE FOR STRATEGY AND EVALUATION SERVICES (2018) IDENTIFYING THE ROLE OF FURTHER AND HIGHER EDUCATION IN CYBER SECURITY SKILLS DEVELOPMENT, UNITED KINGDOM: DEPARTMENT FOR DIGITAL, CULTURE, MEDIA AND SPORT. [ONLINE]. AVAILABLE AT: [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/767425/THE_ROLE_OF_FE_AND_HE_IN_CYBER_SECURITY_SKILLS_DEVELOPMENT.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767425/THE_ROLE_OF_FE_AND_HE_IN_CYBER_SECURITY_SKILLS_DEVELOPMENT.PDF) [ACCESSED 08/05/19]

⁷ WAKELING, P. (2015) PROGRAMME ANALYSIS OF HEFCE'S POSTGRADUATE SUPPORT SCHEME. FINAL REPORT TO ESRC AND HEFCE. SEPTEMBER 2015. [ONLINE]. AVAILABLE AT: [HTTPS://WEBARCHIVE.NATIONALARCHIVES.GOV.UK/20160106165136/HTTP://WWW.HEFCE.AC.UK/PUBS/REREPORTS/YEAR/2015/PSSFINAL/TITLE_105303,EN.HTML](https://webarchive.nationalarchives.gov.uk/20160106165136/http://www.hefce.ac.uk/pubs/rereports/year/2015/pssfinal/title_105303,en.html) [ACCESSED 08/05/19]

A review of current government cyber security interventions⁸ shows that no other initiatives are focusing on postgraduate education. This suggests that the Bursaries Scheme has the potential to contribute to the Initial National Cyber Security Skills Strategy by supporting the postgraduate education of UK cyber security talent, if it is targeted at students from low income backgrounds and other underrepresented groups.

What was the intervention?

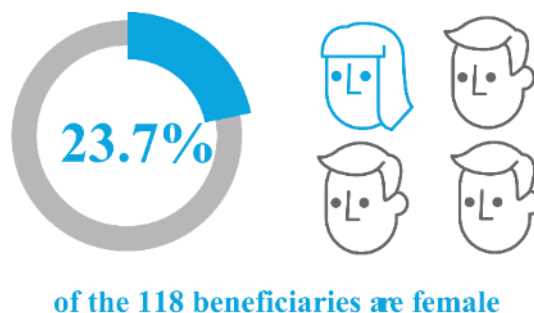
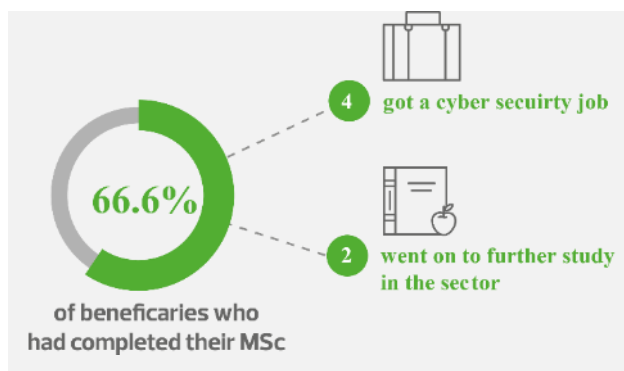
The DCMS pilot cyber security postgraduate Bursaries Scheme (2016/17-2017/18):

- was developed to address the mismatch between the supply of and demand for appropriately skilled cyber security professionals
- is part of a range of DCMS pilot schemes to test different approaches to retraining career transitioners
- aims to increase the volume and diversity of cyber security professionals in the UK, with a particular focus on attracting more women into the sector
- provides bursaries to students living and working in the UK who are transitioning into a career in cyber security through NCSC accredited MSc programmes
- dispersed £1.0 million grant funding to students during the pilot (or 97.4% of the total amount allocated for the pilot)

What has the intervention achieved?

A total of 118 bursaries have been awarded to beneficiaries through the pilot scheme. Eight of those beneficiaries have since dropped out of their MSc programme, leaving 110 who have completed or are on track to complete their MSc (referred to as 'progressing well'). Almost a quarter of beneficiaries are female (23.7%) which is in line with HEI estimates about the proportion of eligible students who are female (20-25%).

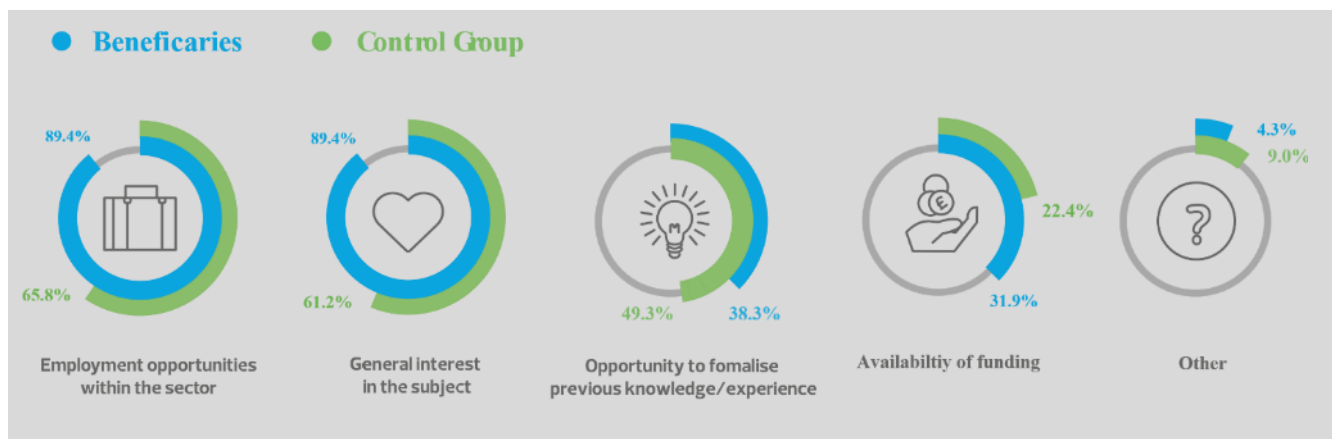
While monitoring data on beneficiary destinations is limited, there is evidence from this evaluation of the DCMS Bursaries Scheme that beneficiaries are transitioning into the sector through the MSc programme. The survey found that 66.6% of the 9 beneficiaries who had completed their MSc got a cyber security job (4 respondents) or went on to further study in the sector (2 respondents) and, of those still studying their MSc, a further 6 respondents had already secured a cyber security job (note low base). This suggests that beneficiaries are moving into cyber security roles.



⁸ HM GOVERNMENT (2018) INITIAL NATIONAL CYBER SECURITY SKILLS STRATEGY: INCREASING THE UK'S CYBER SECURITY CAPABILITY - A CALL FOR VIEWS. [ONLINE]. AVAILABLE AT: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767515/Cyber_security_skills_strategy_211218.pdf [ACCESSED 01/04/19]

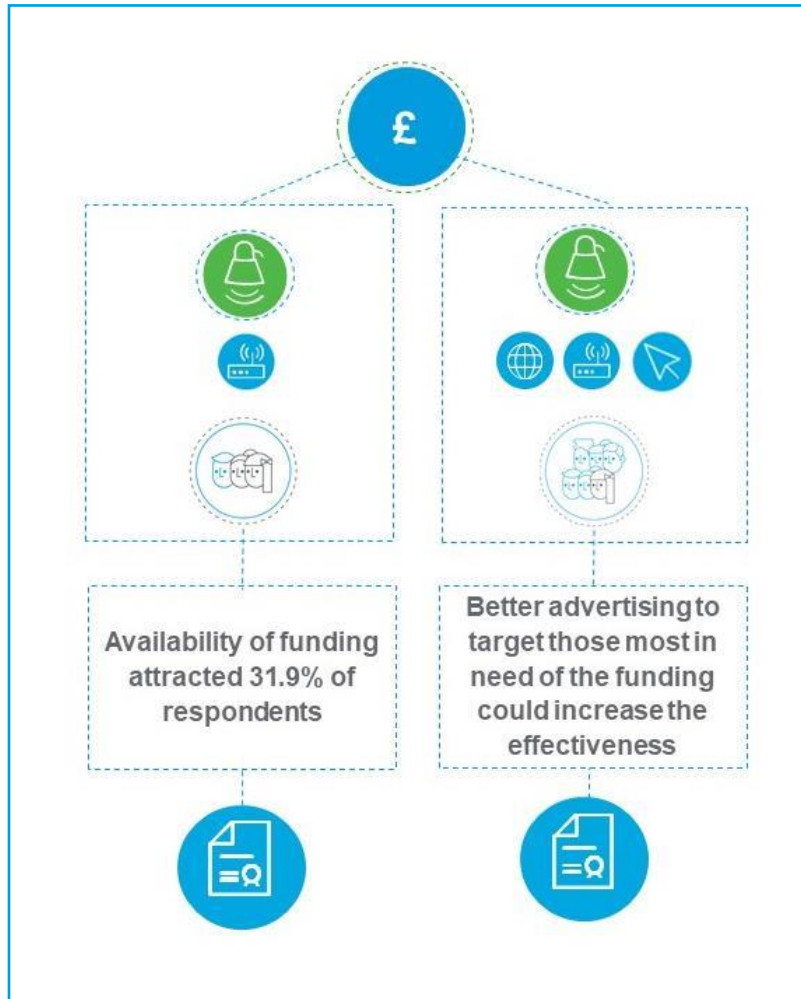
Beneficiaries were positive about the impact that the MSc course would have on their cyber security career. Almost three quarters of respondents agreed or strongly agreed that completing the course has helped (or will help) them to get a cyber security job. A minority of respondents (13.0%) disagreed or strongly disagreed that the programme has helped (or will help) them to get a cyber security job. The open-ended responses given suggest that this could be addressed by more explicitly linking the knowledge acquired through the course to its technical application.⁹

It is important to note that the majority of respondents (78.7%) are still completing the course. This means that the evaluation findings may underestimate the outcomes achieved to date. We recommend, therefore, that DCMS conducts follow up research with beneficiaries in 3 to 5 years, to find out what the impact of the Scheme has been. This study should attempt to identify how many beneficiaries got a cyber security job in the UK and how many remain employed within the sector, as well as how/ what aspects of the course have helped them within their cyber security career, and, in hindsight, what other support would have been beneficial.



⁹ NOTE THIS FINDING RELATES TO THE MSC PROGRAMMES RATHER THAN THE BURSARIES SCHEME

The availability of funding did attract a minority of respondents to apply for the MSc programme (31.9% of respondents to the beneficiary survey and 22.4% of respondents in the control group¹⁰). Employment opportunities within the sector and general interest in the subject were the most important factors (89.4% and 89.4% of respondents to the beneficiary survey and 65.7% and 61.2% of respondents in the control group respectively). However, the survey also found that 44.7% of beneficiary respondents and 28.4% of the control group didn't find out about the Bursaries Scheme until after they were accepted onto the MSc programme. This suggests that the impacts of the Scheme could be improved by better advertising to target those most in need.



There is evidence that at least some of the beneficiaries would not have been able to undertake these studies or secure a cyber security role without the Bursaries Scheme. Based on the survey evidence it is estimated that the Scheme encouraged 35% to 50% of respondents to undertake postgraduate degree in cyber security (estimated additionality of the Scheme is 35% to 50%). Note as the bases for both surveys are relatively low, these figures are indicative only.

¹⁰ TO ENCOURAGE PARTICIPATION RESPONSE TO THE CONTROL GROUP SURVEY WAS INCENTIVISED WITH A £50 RETAIL VOUCHER FOR THE FIRST 100 RESPONDENTS

What lessons can be learned and how could the Bursaries Scheme change to increase its impact?

Linking the Scheme to NCSC accredited programmes shows a joined-up approach by government and sends a clear message to students and industry about the standard of these programmes. Analysis of the fit between the content of these programmes and the identified high-level skills needs shows a good match, for example, between the skills needed for forensic analysis and the content of the NCSC accredited MSc in Digital Forensics. It is less obvious how the content covered by the range of NCSC accredited programmes maps onto the need for security engineering or penetration testing.



Recommendation 1: Government should support industry to recruit suitable cyber security professionals by providing clearer pathways for cyber security professionals and mapping the NCSE MSc course material to specific high-level skills and tasks



Recommendation 2: Research shows that for financial assistance to be effective it needs to be targeted according to financial need.¹¹ DCMS should provide guidance on how it expects the HEIs to assess applicants' financial circumstances as part of the bursaries application and selection process to make sure the funds are awarded to those who need them most¹²



Recommendation 3: As more courses become NCSC accredited it may be necessary for DCMS to introduce some form of selection criteria to determine the allocation of funding between a larger number of HEIs. DCMS should consider regional or place based allocations to make sure that the opportunities for funded places are distributed equitably across the UK

The timing of DCMS confirmation of funding to each HEI (in March and April) and postgraduate recruitment timeframes (during the second semester between January and May), has resulted in limited promotion of the Bursaries Scheme to date. This has negatively affected the Scheme's ability to attract people, particularly from the target groups, to do a Master's in cyber security. As both timeframes are dependent on larger institutional factors neither is likely to change. Therefore:

Recommendation 4: DCMS and the universities involved should consider alternative methods of promoting the Scheme and making potential applicants aware of the support available

For example, using the National Union of Students (NUS) to promote the Bursaries Scheme to its members via NUS affiliated hacking clubs and societies and by signposting the Scheme via the NCSC, Women's Security Society and other industry representatives' websites.

¹¹ WAKELING, P. (2015) PROGRAMME ANALYSIS OF HEFCE'S POSTGRADUATE SUPPORT SCHEME. FINAL REPORT TO ESRC AND HEFCE. SEPTEMBER 2015.

https://webarchive.nationalarchives.gov.uk/20160106165136/http://www.hefce.ac.uk/pubs/rereports/year/2015/pssfinal/title_105303_en.html [ACCESSED 08/05/19]

¹² THIS RECOMMENDATION WAS ACTIONED BY DCMS IN YEAR 3 OF THE BURSARIES SCHEME (AFTER THE 2 YEAR PILOT)

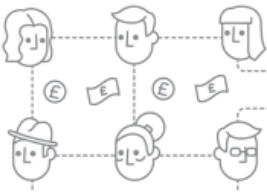
There is currently a lack of consistency in how universities select bursary recipients. While this is acceptable for a small-scale pilot, on a larger scale and at a national level, greater consistency will be required to make sure the selection process is equitable. Therefore, in addition to guidance on assessment of financial need (see Recommendation 2):



Recommendation 5: DCMS should set out a clear policy for how it expects universities to apply the selection criteria, including the extent to which university inclusion teams should be involved in this process, to make sure that the bursaries are reaching the target beneficiaries, including those from ethnic minority backgrounds

There is also a lack of consistent management information held by the universities. We recommend that:

Recommendation 6: DCMS sets clear objectives covering the data it expects universities to collect and keep



Recommendation 7: DCMS considers establishing a beneficiary community to enable long term follow up research and create a virtual community of cyber security professionals from currently underrepresented groups

A beneficiary community would also have the added benefit of creating a national peer support group and facilitating networking and mentoring opportunities for current and future beneficiaries.

There is also the potential to link the outputs of the beneficiaries' degree to national research priorities by:



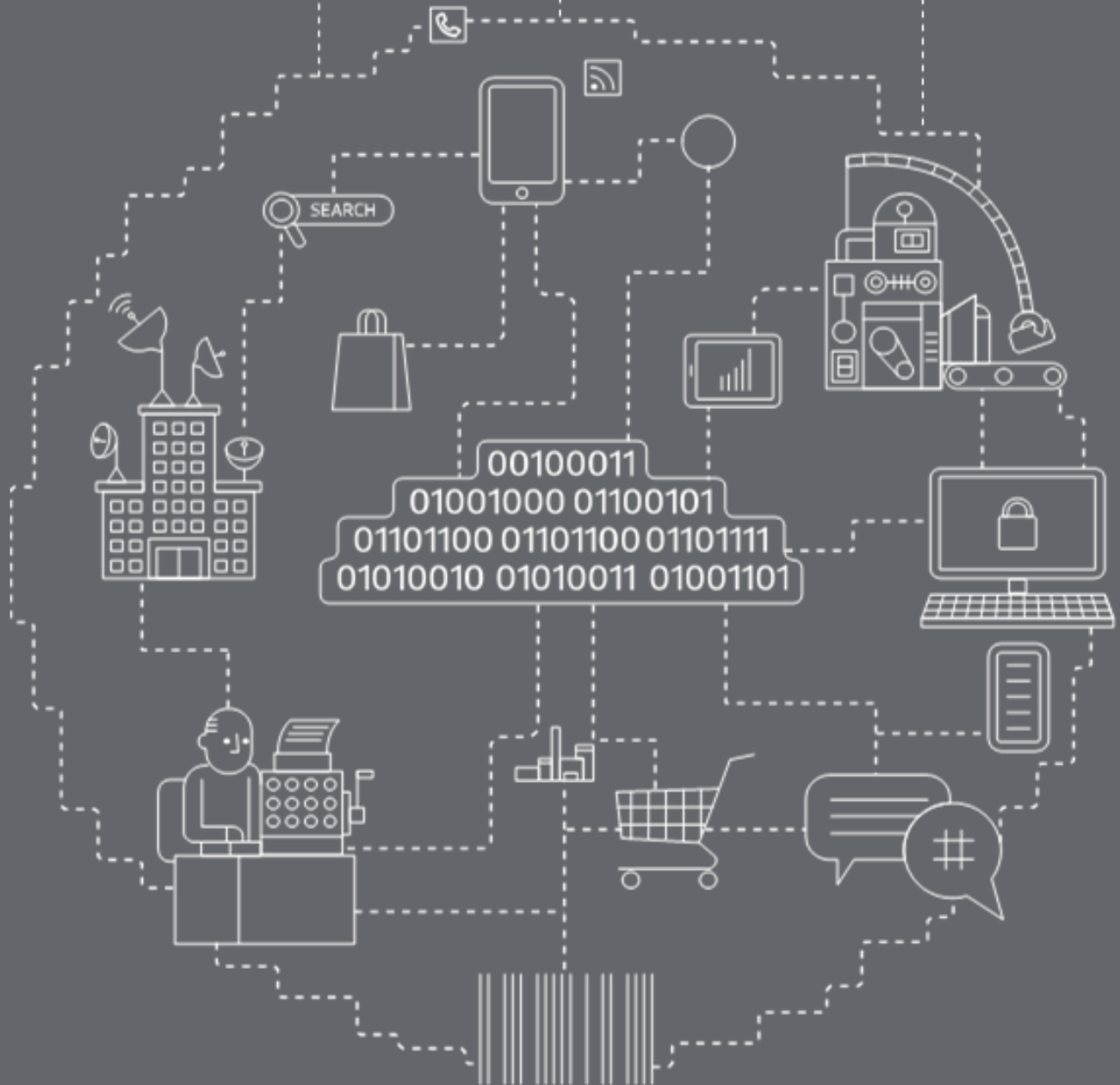
Recommendation 8: Supporting bursary beneficiaries that choose a dissertation topic aligned to the National Cyber Security Strategy

This could potentially involve a sponsor from DCMS or the NCSC to ensure their research is aligned to national cyber security research interests.

Is the Bursaries Scheme an effective form of government intervention?

Does it represent value for money?

What impact has this Scheme had?



1. INTRODUCTION

1.1 Overview

In December 2018 RSM UK Consulting LLP (RSM) was appointed by the Department for Digital, Culture, Media and Sport (DCMS) to evaluate its cyber security postgraduate Bursaries Scheme. This report summarises the findings of the evaluation.

The purpose of this section of the report is to set out the terms of reference of the evaluation, the methodology used and structure of this report.

In line with rules around disclosure of funding amounts under the National Cyber Security Programme some financial information, including assessment of value for money, is not included in this published version.

1.2 Terms of reference

Terms of Reference

This evaluation seeks to answer the following research questions that were set out in the Invitation to Tender (ITT) and refined during the evaluation:

1. Is the Bursaries Scheme an effective form of government intervention that succeeds in its aim of getting candidates into cyber security through National Cyber Security Centre (NCSC) accredited MSc programmes?
2. What impact has this Scheme had in getting candidates into cyber security roles and would they have otherwise been able to undertake these studies?

1.3 Methodology

RSM designed a methodology to address these research questions. This was agreed in collaboration with DCMS. It includes the following 5 stages:

- **Stage 1: Desk research** – involving a review of available monitoring information and contract documentation for the Scheme and a review of recent research into the need for cyber security professionals, at this stage we also mapped the Scheme against a cyber security framework¹³ to see whether it is focused on the main skills gaps.
- **Stage 2: Student surveys** - we developed 2 online surveys which were distributed, via the 14 Higher Education Institutions (HEIs) that took part in the Scheme, to:
 - Students that received a bursary through the Scheme (beneficiaries) - achieving 47 responses¹⁴

¹³ CYBER SECURITY BODY OF KNOWLEDGE (CYBOK) AND NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) CYBER SECURITY FRAMEWORKS WERE BOTH CONSIDERED FOR THIS EVALUATION. HOWEVER AS CYBOK IS STILL IN DEVELOPMENT, WHICH RAISED CONCERNS ABOUT HOW FAMILIAR IT WOULD BE TO RESEARCH PARTICIPANTS. THE EVALUATION TEAM PROVIDED THIS FEEDBACK TO THE CYBOK TEAM. IT WAS WELL RECEIVED. THE SURVEY QUESTIONNAIRES AND CONSULTATION TOPIC GUIDES, THEREFORE, ARE FRAMED AROUND NIST, WHICH IS MORE WIDELY KNOWN AND REINFORCED BY MANY VENDORS. THEY INCLUDED QUESTIONS ON IDENTIFY, PROTECT, DETECT, RESPOND AND RECOVER AS WELL AS THE 'HUMAN, ORGANISATIONAL AND REGULATORY' ASPECTS OF CYBOK.

¹⁴ THE TOTAL POPULATION FOR THIS GROUP WAS 118. THE 47 RESPONSES RECEIVED RESULTS IN A 40% RESPONSE RATE, WHICH IS RELATIVELY HIGH FOR AN EXTERNAL ONLINE SURVEY ADMINISTERED VIA A THIRD PARTY. HOWEVER, DUE TO THE RELATIVELY LOW POPULATION (THE TOTAL NUMBER OF STUDENTS WHO RECEIVED A BURSARY) THE MARGIN OF ERROR FOR THIS SURVEY IS RELATIVELY HIGH (+/- 11% AT THE 95% CONFIDENCE LEVEL). THIS MEANS THAT SURVEY FINDINGS ARE INDICATIVE AND SHOULD NOT BE GENERALISED TO REPRESENT THE WHOLE POPULATION.

- People who applied for a bursary but were unsuccessful (control group) - achieving 67 responses¹⁵, to encourage participation response to the control group survey was incentivised with a £50 retail voucher for the first 100 respondents
- **Stage 3: Consultations** with:
 - DCMS representatives
 - Staff from 13 of the 14 HEIs
 - Five sector representatives
- **Stage 4: Beneficiary case study** development – 13 beneficiaries agreed to be a case study subject, together they represent 8 of the 14 participating universities¹⁶
- **Stage 5: Analysis and reporting** – analysis of the research findings has been shared with DCMS throughout the evaluation, in accordance with the evaluation plan, this report summarises the analysis, conclusions and recommendations for the Scheme

1.4 Report structure

The remainder of this report is structured under the following sections:

- Need for government intervention
- Intervention
- Performance
- Conclusions and recommendations
- Appendix A: Profile of survey respondents
- Appendix B: Additional case studies

Through this structure we seek to establish:

- i. why government intervention was needed (Section 2)
- ii. what the Bursaries Scheme intervention is (Section 3) and what it has achieved to date (Section 4)

¹⁵ DUE TO INCOMPLETE DATA PROVIDED BY SOME OF THE UNIVERSITIES INVOLVED IN THE BURSARIES SCHEME, THE TOTAL POPULATION FOR THIS GROUP IS UNKNOWN. WE ARE, THEREFORE, UNABLE TO CALCULATE THE MARGIN OF ERROR FOR THIS SURVEY. FOR THIS REASON, THESE SURVEY FINDINGS ARE ALSO BEING TREATED AS INDICATIVE.

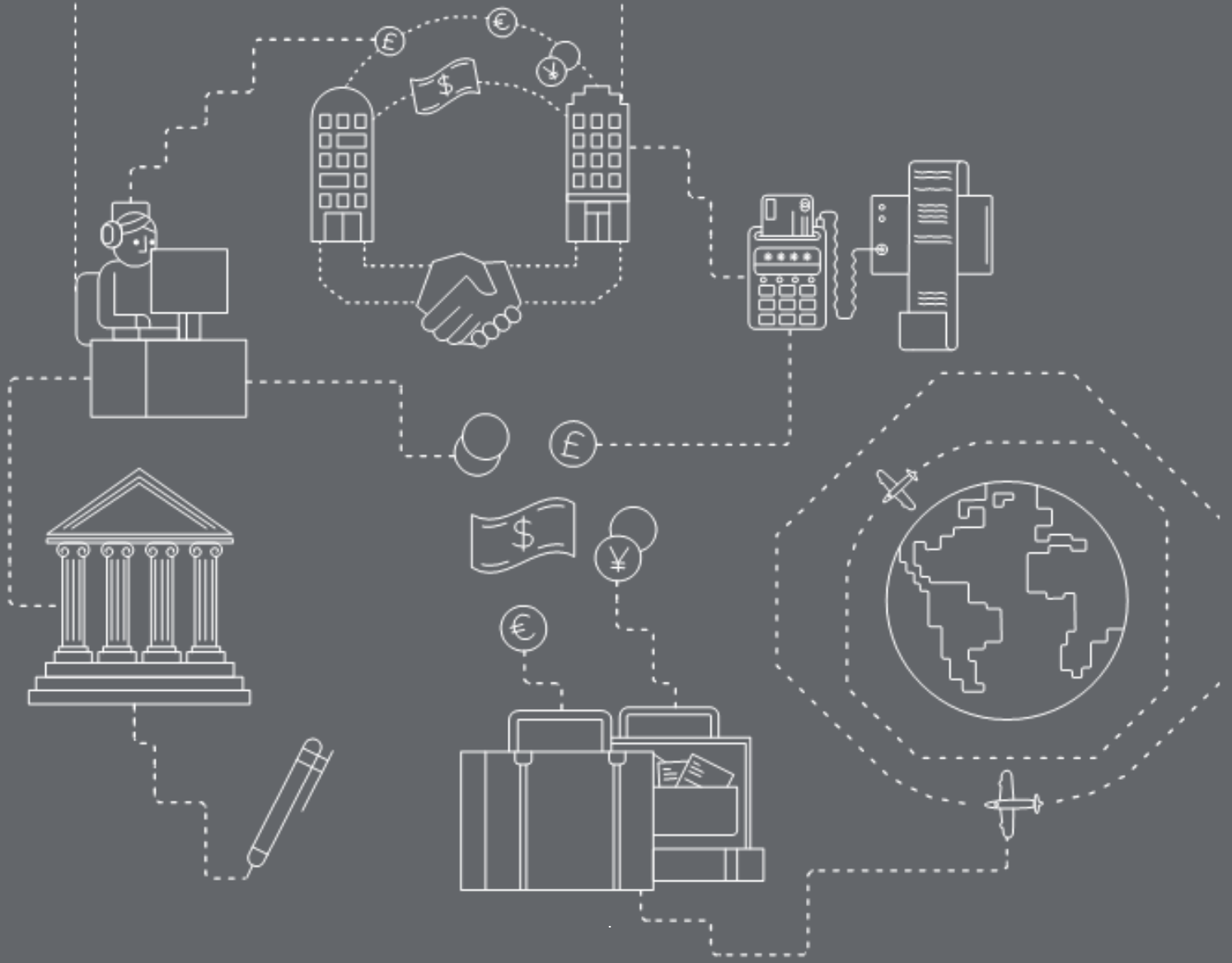
¹⁶ THE CASE STUDIES PRESENTED THROUGHOUT THIS REPORT HAVE BEEN ANONYMISED, NAMES HAVE BEEN CHANGED TO PROTECT THE INDIVIDUALS' PRIVACY.

33%

of young women think
that cyber security
professionals are
'geeks'

31%

of businesses are not
confident in performing
high-level technical
tasks



2. NEED FOR GOVERNMENT INTERVENTION

2.1 Overview

The purpose of this section is to explain why government intervention was needed. It is structured under the following sub headings:

- Policy context – *which outlines the context within which the Bursaries Scheme operates*
- Need for cyber security professionals – *which summarises the current demand for cyber security skills in the UK*
- Need for a cyber security Bursaries Scheme – *which explains how the Scheme aims to address the skills shortage and improve diversity*
- Summary – *which presents findings on the need for government intervention*

2.2 Policy context

In 2016, the Chancellor announced that the Government would invest £1.9 billion over the next 5 years to protect the UK from cyber attack.¹⁷ As the nation's ability to defend itself in cyber space relies on a strong skills and knowledge base, some of this investment focused on a skills programme to grow the UK's cyber capable workforce.

The DCMS cyber security postgraduate Master's Bursaries Scheme was one of a number of interventions that aim to retrain career transitioners for a cyber security role. It is funded under the National Cyber Security Programme (NCSP).¹⁸ While the Scheme initially focused on career transitioners, it has been extended to include recent graduates.

The Scheme is linked to the National Cyber Security Strategy, the Initial National Cyber Security Skills Strategy and the UK Digital Strategy. The remainder of this subsection describes each of these strategies and how the Bursaries Scheme fits with their objectives.

2.2.1 National Cyber Security Strategy (2016-2021)

The National Cyber Security Strategy¹⁹ identifies the following issues (or market failures) that have led to the cyber skills shortage in the UK:

- the lack of young people entering the cyber security profession
- the shortage of current cyber security specialists
- the absence of established career and training pathways into the profession

The Bursaries Scheme is directly linked to the first 2 of these issues because it aims to increase the supply of UK cyber security talent by encouraging people to undertake postgraduate studies in cyber security. The existence of the Scheme could also contribute to addressing the final point, by helping to raise awareness of National Cyber Security Centre (NCSC) accredited programmes as a pathway into the profession.

It also has the potential to link to the following target outcomes of the strategy:

¹⁷ NCSC (2017), *BRITAIN TO ENTER 'NEW ERA OF ONLINE OPPORTUNITY'* [ONLINE] AVAILABLE AT: <https://www.ncsc.gov.uk/news/britain-enter-new-era-online-opportunity> [ACCESSED 22/03/2019]

¹⁸ IT IS A PRINCIPLE OF FUNDING THROUGH THE NCSP THAT THE DETAIL OF INDIVIDUAL NCSP FUNDING SHOULD NOT BE MADE PUBLIC FOR NATIONAL SECURITY REASONS. FOR THAT REASON THE FUNDING INFORMATION PRESENTED THROUGHOUT THIS REPORT IS PRESENTED AT THE OVERALL SCHEME LEVEL.

¹⁹ HM GOVERNMENT (2016) *NATIONAL CYBER SECURITY STRATEGY 2016 – 2021*. [ONLINE] AVAILABLE AT: [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/567242/NATIONAL_CYBER_SECURITY_STRATEGY_2016.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/567242/national_cyber_security_strategy_2016.pdf) [ACCESSED 08/05/19]

- effective and clear entry routed into the cyber security profession for a diverse range of people
- identify and support quality cyber graduate and postgraduate education, and identify and fill any specialist skills gaps

2.2.2 Initial National Cyber Security Skills Strategy (2018)

This strategy aims to ensure ‘the UK has a sustainable supply of home-grown cyber skilled professionals to meet the growing demands of an increasingly digital economy, both in the public and private sectors, and defence’.²⁰

The Bursaries Scheme is directly linked to the strategy’s objective of ensuring ‘the UK has education and training systems that provide the right building blocks to help identify, train and place new and untapped cyber security talent’ as it encourages postgraduate study in cyber security amongst people who have previously not studied it or been engaged in a cyber security role.

2.2.3 UK Digital Strategy (2017)

The UK Digital Strategy²¹ acknowledges the cyber security skills shortage in the UK and highlights the need to create a safe and secure cyber space. This strategy includes measures to provide a pipeline of cyber skills to actively secure and defend businesses and individuals in the UK against cyber threats. It states this will be achieved through a series of initiatives, including a retraining programme for people changing to cyber security mid-career, which is aligned to the aims of the Bursaries Scheme.

2.3 Need for cyber security professionals

In recent years the cyber threat has continued to diversify and grow, and it is predicted there will be a global shortfall of 3.5 million open cyber security jobs by 2021.²² Around half of UK businesses were affected by cyber security breaches²³ (43% of businesses and 19% of charities based in the UK experienced a cyber security breach or attack in 2018),²⁴ but only 27% of businesses and 21% of charities in the UK have a formal cyber security policy.²⁵

The UK cyber security labour market is relatively immature,²⁶ with only a small number of individuals having previously worked in professional roles in cyber security and many having absorbed this role into an existing non-cyber security job. Moreover, it is suggested there is a large informal cyber security sector, where the individuals working in these roles often lack the technical expertise to fully understand or carry out their work.²⁷

²⁰ HM GOVERNMENT (2018) INITIAL NATIONAL CYBER SECURITY SKILLS STRATEGY: INCREASING THE UK’S CYBER SECURITY CAPABILITY - A CALL FOR VIEWS. [ONLINE] AVAILABLE AT: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767515/Cyber_security_skills_strategy_211218.pdf [ACCESSED 01/04/19]

²¹ HM GOVERNMENT (2017) UK DIGITAL STRATEGY. [ONLINE] AVAILABLE AT: <https://www.gov.uk/government/publications/uk-digital-strategy/uk-digital-strategy> [accessed 08/05/19]

²² CYBERSECURITY VENTURES (2017) CYBERSECURITY JOBS REPORT 2018-2021. [ONLINE] AVAILABLE AT: [HTTPS://CYBERSECURITYVENTURES.COM/JOBS/](https://cybersecurityventures.com/jobs/) [ACCESSED 08/05/19]

²³ BEAMING (2017). THE COST OF CYBER SECURITY BREACHES: BRITISH BUSINESSES LOST ALMOST £30 BILLION IN 2016. [ONLINE] AVAILABLE AT: <https://www.beaming.co.uk/press-releases/cyber-security-breaches-cost-businesses-30-billion/> [ACCESSED 28/01/2019]

²⁴ DCMS (2018) CYBER SECURITY BREACHES SURVEY. [ONLINE] AVAILABLE AT: [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/702074/CYBER_SECURITY_BREACHES_SURVEY_2018_-_MAIN_REPORT.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/702074/CYBER_SECURITY_BREACHES_SURVEY_2018_-_MAIN_REPORT.PDF)

²⁵ IBID

²⁶ IPSOS MORI (2018) UNDERSTANDING THE UK CYBER SECURITY SKILLS LABOUR MARKET. [ONLINE] AVAILABLE AT: [HTTPS://WWW.IPSOS.COM/SITES/DEFAULT/FILES/CT/PUBLICATION/DOCUMENTS/2019-01/UNDERSTANDING_THE_UK_CYBER_SECURITY_SKILLS_LABOUR_MARKET.PDF](https://www.ipsos.com/sites/default/files/ct/publication/documents/2019-01/understanding_the_uk_cyber_security_skills_labour_market.pdf) [ACCESSED 08/05/19]

²⁷ THESE FINDINGS DO NOT SPECIFICALLY REFLECT FIRMS IN THE CYBER SECURITY INDUSTRY ITSELF (THE ONES WORKING ON CYBER SECURITY TECHNOLOGICAL DEVELOPMENTS, PRODUCTS OR SERVICES) – THEY REPRESENT THOSE WORKING IN CYBER SECURITY ROLES WITHIN OTHER INDUSTRIES

Research shows that:²⁸

- All sectors are facing at least some basic or high-level skills need
- There is a general lack of confidence in performing high-level cyber security tasks (31% are not very or not at all confident in performing high-level technical tasks)
- The greatest skills gaps for high-level technical tasks are in the areas of:
 - Security engineering
 - Penetration testing
 - Forensic analysis

This literature review demonstrates the high-level technical skills shortage in the UK.

2.4 Need for a cyber security Bursaries Scheme

The DCMS postgraduate Bursaries Scheme aims to help adults retrain for a career in cyber security by taking a NCSC certified Master's degree. The bursary fund is focused on attracting new individuals to the profession with a strong focus on encouraging more women into the sector to address the current underrepresentation of women in the cyber security workforce.

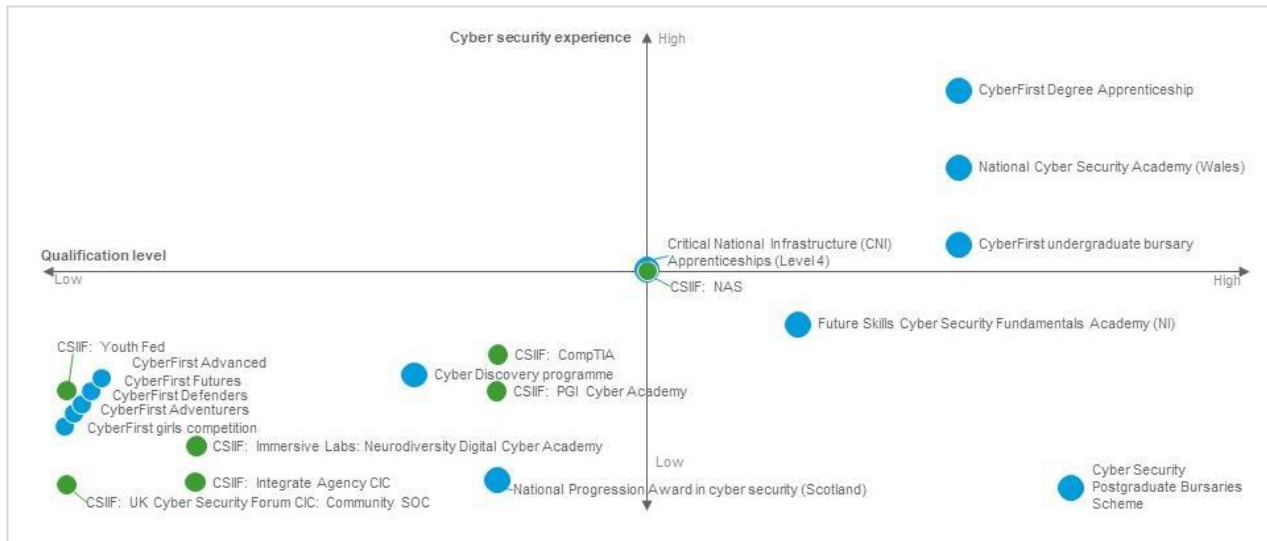
2.4.1 Existing support

The Bursaries Scheme is part of a range of DCMS initiatives to help address the cyber security skills gap. Figure 2.1 is based on the research to inform the Initial National Cyber Security Skills Strategy. It shows the range of government supported training interventions available in the UK. It includes those that are seed-funded by government to be taken forward by industry and those that are sponsored by government to feed into wider government cyber security skills requirements. The vertical axis indicates the amount of cyber security experience gained through each initiative, in terms of time (from no practical experience to job shadowing and work-based placements and projects), and the horizontal axis indicates the level of qualification gained (ranging from no formal qualifications to Level 8 on the national qualifications framework (PhD or DPhil)). It should be noted that, where an initiative results in a certificate rather than a specific level of qualification, subjective judgements have been made about the relative qualification level.

²⁸ IPSOS MORI (2018) UNDERSTANDING THE UK CYBER SECURITY SKILLS LABOUR MARKET. [ONLINE] AVAILABLE AT: [HTTPS://WWW.IPSOS.COM/SITES/DEFAULT/FILES/CT/PUBLICATION/DOCUMENTS/2019-01/UNDERSTANDING_THE_UK_CYBER_SECURITY_SKILLS_LABOUR_MARKET.PDF](https://www.ipsos.com/sites/default/files/ct/publication/documents/2019-01/understanding_the_uk_cyber_security_skills_labour_market.pdf) [ACCESSED 08/05/19]

Figure 2.1 shows that there are a number of existing government funded initiatives, which offer a breadth and diversity in terms of the level of qualification and the amount cyber security experience gained. The Bursaries Scheme is the only government funded initiative which targets the high-level skills gap by providing financial support to students undertaking a NCSC accredited post graduate MSc programme.

Figure 2.1: Publicly funded cyber security training initiatives



SOURCE: RSM ANALYSIS OF INITIAL NATIONAL CYBER SECURITY SKILLS STRATEGY

KEY: ● CSIIIF PROJECTS (DUE TO THE DIVERSE NATURE OF THE 7 PROJECTS FUNDED UNDER THE CSIIIF PILOT THESE HAVE BEEN PRESENTED SEPARATELY AND COLOURED GREEN TO DISTINGUISH THEM FROM THE OTHER INTERVENTIONS)

● OTHER INTERVENTIONS

NOTES: THE DIGITAL SCHOOLS AWARDS IN SCOTLAND AIMS TO HELP SCHOOLS DEVELOP THEIR DIGITAL SKILLS PROVISION FROM EARLY YEARS (NURSERY SCHOOL) ONWARDS. THIS WOULD SIT IN THE BOTTOM LEFT QUADRANT OF FIGURE 2.1.

The HEI representatives felt that cyber security is only beginning to emerge as a coherent profession. The MSc programmes can help to address the technical debt by quickly reskilling people with the relevant skillset to work in cyber security (meaning those with a technical background) and the Bursaries Scheme can help to encourage more people into these programmes. However, because the pool of suitable candidates is limited to those with a relevant technical background, the potential diversity of those candidates is also limited by the current lack of diversity within the Information Technology (IT) industry more generally (see Section 2.4.3). If the Bursaries Scheme were to successfully increase the diversity of the cyber security sector, it could potentially have a negative impact on diversity within other parts of the IT industry in the short term by leaving fewer women in IT.

As the education system develops cyber security knowledge at all levels, then the needs at postgraduate level will change. However, there is still significant change needed before this can happen, as summarised in the text box overleaf.

<p>HEI perceptions of the changes required at each level of the education system to develop the UK's cyber security provision</p>	Aim	cyber security at this stage should focus on safe operation of technology (for example, how to protect yourself from risks/threats).
	Secondary Level	cyber security at secondary level should be split into two streams as pupils start to make decisions about what career/ academic pathway they want to pursue: one for professionals (detect and defend, hacker clubs etc); and one for generalists (how to use IT securely). Some cyber security is being taught at secondary level. One HEI commented that teachers are contacting the university looking for resources for students aged 13-15. It is also important these students are aware of the career options available to them in cyber security.
	Undergraduate Level	there is the potential to introduce cyber elements into more courses at undergraduate level, with a focus on the practical skills (for example use of cryptography).
	Postgraduate Level	HEI consultations suggest that the NCSC accredited MSc programmes have been filling a gap in training provision at an earlier stage (from primary to undergraduate level). As cyber security becomes more embedded at lower levels a MSc conversion course will be more relevant.

Source: RSM analysis of HEI consultations

2.4.2 Fit of the NCSC accredited programmes with high-level technical skills needs

The National Cyber Security Strategy noted an absence of clear training routes into the ecosystem. Frameworks, such as the NCSC's emerging Cyber Security Body of Knowledge and Institute of Information Security Professionals' (IISP) skills framework (on which NCSC's certification of cyber skills is based), identify what knowledge and skills a professional might be expected to have acquired, but they cover a very wide range of skills and are not clear about how much knowledge and which skills might be gained at various stages on the way to becoming a professional. This means that a Master's course must be selective in terms of the material covered. Different Master's programmes also vary in the balance between knowledge and skills. It is, therefore, not clear how many of the high-level skills discussed in Section 2.3 a postgraduate student might be expected to be proficient in.

The NCSC currently certifies four different kinds of Master's degree courses:²⁹

- General Cyber Security
- Digital Forensics
- Computer Science for Cyber Security
- Computer Network and Internet Security

Whilst there is a good match between the skills needed to carry out forensic analysis roles and the content of NCSC accredited Digital Forensics Master's courses, the other tasks in Section 2.3 do not map so cleanly onto the NCSC accredited MSc programmes. An employer will need to drill down into the specifics of a course and which options an applicant has selected to determine whether they are likely to have an appropriate grounding for particular roles.

²⁹https://www.iisp.org/iisp/about_us/our_frameworks/our_skills_framework/iispv2/accreditation/our_skills_framework.aspx?hkey=e77a6f03-9498-423e-aa7b-585381290ec4

For example, different kinds of companies might require very different mixes of security architecture knowledge and skills including but not limited to: policy; information management; and low-level understanding of how devices boot. So, although the companies might agree that we need more security architects they might well be looking for different kinds of knowledge and skills.

Therefore, while an NCSC certification might well provide confidence that the course is of the right standard, it will not be sufficient to determine which areas have been covered. When an employer is already lacking the high-level skills they need, this requirement to probe deeply places a high burden on identifying suitable hires.

Students could well select options and a thesis topic on any of the courses that prepares them for several of the roles in Section 2.3, but it is not obvious how they would know how to do that, or how employers would know that they had. While these findings relate to the content of the NCSC accredited MSc programmes, rather than the bursaries that fund tuition fees only, they could create barriers to the employment of beneficiaries and therefore should be considered and accounted for in the Bursaries Scheme. These barriers could be overcome by creating clearer pathways into the profession, and clearer mapping of NCSC accredited MSc programme material to high-level skills and tasks.

2.4.3 Need for a more diverse workforce



We've spent years talking about how to improve diversity (race, gender, neurodiversity etc) in the sector. Now's the time to actually **do** something about it. All the pipelines of new talent we're building will be for nought if we don't have a welcoming and inclusive community for this new talent to explore.

Ian Levy
Technical Director, NCSC

Just 17% of the IT workforce is female. 17% is non-white, 21% is aged over 50 and only 8% have a disability.³⁰ The lack of diversity in the cyber security sector and need to correct it, not only in terms of gender, but also in terms of neuro, social, ethnic and other forms of diversity is one of the target outcomes of the National Cyber Security Strategy.³¹

A report³² by Ecorys on the demand for and supply of digital skills in the UK highlights the lack of awareness of career opportunities within the digital sector as a market failure, sometimes reflecting skill and gender stereotypes around the types of roles that exist. Barriers exist, especially for women, who are underrepresented on higher education courses in computer related subjects, and within the industry as a whole.

³⁰ BRITISH COMPUTER SOCIETY (BCS) (2017) DIVERSITY IN IT 2017: SHAPING OUR FUTURE TOGETHER. AVAILABLE AT: <https://www.bcs.org/upload/pdf/diversity-report-2017.pdf> [ACCESSED 28/03/19]

³¹ HM GOVERNMENT (2016) NATIONAL CYBER SECURITY STRATEGY 2016 - 2021 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/567242/national_cyber_security_strategy_2016.pdf [accessed 08/05/19]

³² ECORYS (2016) DIGITAL SKILLS FOR THE UK ECONOMY. AVAILABLE AT: [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/492889/DCMSDIGITALSKILLSREPORTJAN2016.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492889/DCMSDIGITALSKILLSREPORTJAN2016.PDF) [ACCESSED 08/05/19]

More needs to be done to attract women into the industry. Research indicates that the majority of young women have already decided against a career in cyber security before the age of 16.³³ 33% of young women think that cyber security professionals are ‘geeks’, potentially contributing to the fact that 78% had never considered a career in cyber security. This is supported by research which highlights that the sector is ‘full of male connotations’. This suggests that there is a perception problem around cybersecurity careers, and that this, combined with the fact young women are making their career choices at a young age, is making it difficult for the industry to encourage women into the sector. The Centre for Strategy and Evaluation Services (2018)³⁴ contends that although measures have been introduced to encourage more women into the cyber security sector, it is still dominated by stereotypes and perceived as male-dominated and ‘geeky’. These stereotypes were said to result in reduced awareness of career opportunities and subsequently restrict the proportion of females in the cyber security sector. This research found that just 13.1% of students that undertook a level 3 class-based course in Information and Communications Technology (ICT) in 2016/17 were female, this is 16.6% less than the proportion of women who enrolled in these courses in 2014/15. Higher Education Student Affairs (HESA) data states that just 16% of students that started a cyber security degree in 2016/2017 were female.

According to a survey by YouthSight (2018)³⁵, financial concerns were a secondary concern for students³⁶ considering higher education. This was the case regardless of socio-economic background. Although the evidence showed that it was slightly more important to those from lower socio-economic groups. The desire to improve employment opportunities, achieve the qualification and pursue an interest in the subject were more than twice as likely to be rated as important to the applicants’ decision to go to university than considerations of cost. Exploration of the available student finance offer showed that, although it was not critical in overall decision making, the availability of financial support (loans, grants, etc.) was something that helped persuade them to apply to university despite the costs.

Government support towards living costs was particularly appealing to applicants and appeared to have a strong effect on safeguarding applications to higher education (aged 21 or over) and those expecting to get a full grant. When given a scenario where no maintenance support (grants or loans) was available, over a third of applicants reported that they would no longer apply to university (rising to over half of those from the lower socio-economic groups, aged 21 or over and those expecting to get a full grant). This survey also identified that 62% of applicants aged over 21 were put off by the costs of university to some extent.³⁷

³³ KASPERSKY LAB (2017) BEYOND 11%: A STUDY INTO WHY WOMEN ARE NOT ENTERING CYBERSECURITY [ONLINE] AVAILABLE AT: [HTTPS://D1SRLIRZDLMPEW.CLOUDFRONT.NET/WP-CONTENT/UPLOADS/SITES/86/2017/11/03114046/Beyond-11-Percent-Futureproofing-Report-EN-FINAL.PDF](https://d1srlirzdlmpew.cloudfront.net/wp-content/uploads/sites/86/2017/11/03114046/Beyond-11-Percent-Futureproofing-Report-EN-FINAL.pdf) [ACCESSED 15/02/2019]

³⁴ CENTRE FOR STRATEGY AND EVALUATION SERVICES (2018) IDENTIFYING THE ROLE OF FURTHER AND HIGHER EDUCATION IN CYBER SECURITY SKILLS DEVELOPMENT, UNITED KINGDOM: DEPARTMENT FOR DIGITAL, CULTURE, MEDIA AND SPORT. [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/767425/THE_ROLE_OF_FE_AND_HE_IN_CYBER_SECURITY_SKILLS_DEVELOPMENT.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767425/The_Role_of_FE_and_HE_in_Cyber_Security_Skills_Development.pdf) [ACCESSED 08/05/19]

³⁵ FAGENCE, S. AND HANSOM, J. (YOUTHSIGHT) (2018) INFLUENCE OF FINANCE ON HIGHER EDUCATION DECISION-MAKING, LONDON: DEPARTMENT FOR EDUCATION. [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/693188/INFLUENCE_OF_FINANCE_ON_HIGHER_EDUCATION_DECISION-MAKING.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693188/Influence_of_Finance_on_Higher_Education_Decision-Making.pdf) [ACCESSED 08/05/19]

³⁶ THIS GROUP IS REPRESENTATIVE OF ENGLISH DOMICILES WHO HAD SUBMITTED A UNIVERSITIES AND COLLEGES ADMISSIONS SERVICE (UCAS) APPLICATION TO STUDY AT A PUBLICLY FUNDED UNIVERSITY IN THE UK FOR A FULL-TIME FIRST DEGREE IN 2015/2016 OR 2016/2017.

³⁷ FAGENCE, S. AND HANSOM, J. (YOUTHSIGHT) (2018) INFLUENCE OF FINANCE ON HIGHER EDUCATION DECISION-MAKING, LONDON: DEPARTMENT FOR EDUCATION. [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/693188/INFLUENCE_OF_FINANCE_ON_HIGHER_EDUCATION_DECISION-MAKING.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693188/Influence_of_Finance_on_Higher_Education_Decision-Making.pdf) [ACCESSED 08/05/19]

According to the Office for Fair Access consultations with HEIs, parents and HE advisers and survey of 5,000 students (OFFA, 2009), bursaries and scholarships (particularly the most generous ones) are an influential recruitment tool for a minority of students.³⁸ Their reasoning is based on the Birkbeck Survey of Students (2008), which identifies that bursaries of £1,000 or more had a greater impact on students' higher education decisions than less generous ones.³⁹ There is also evidence that bursaries and other financial support enables retention and increases the chances of completion.⁴⁰ Bursary students are more likely to continue with their studies one year after entry than students from low income backgrounds who were not in receipt of financial assistance.⁴¹ Each £1,000 of financial support increases the likelihood of gaining a good degree by almost 4%, due to an increase in annual completion rates and course scores.⁴² This study suggests that bursaries can be an effective means of encouraging the participation and retention of underrepresented groups.

There is also an identified need for government intervention at postgraduate level to support participation from the economic disadvantaged backgrounds.⁴³ However, research indicates that to be effective, financial assistance should be targeted according to need and requires assessment of the student's financial circumstances, which should be taken into account in the DCMS Scheme.

The evaluation of the 2015/16 HEFCE postgraduate student support scheme (PSS2) concluded that while financial assistance had a modest impact on the overall demand from underrepresented groups, the scheme did appear to have successfully mitigated the potential decline from these target groups. This was set against the backdrop of increased undergraduate tuition fees in 2015/16.⁴⁴

³⁸ OFFA (2009) *AWARENESS, TAKE-UP AND IMPACT OF INSTITUTIONAL BURSARIES AND SCHOLARSHIPS IN ENGLAND*, LONDON: OFFA.

³⁹ 31% OF STUDENTS EXPECTING A BURSARY OF £1,000 OR MORE CONSIDERED BURSARIES IMPORTANT WHEN DECIDING ON WHICH UNIVERSITY TO APPLY TO COMPARED TO 26% OF THOSE ANTICIPATING A BURSARY OF £310 OR LESS, AND 18% OF THOSE AWAITING A BURSARY BETWEEN £310 AND £500.

⁴⁰ NURSAW ASSOCIATES (2015) *WHAT DO WE KNOW ABOUT THE IMPACT OF FINANCIAL SUPPORT ON ACCESS AND STUDENT SUCCESS?* OFFA, APRIL 2015; AND

OFFA (2016) *UNDERSTANDING THE IMPACT OF INSTITUTIONAL FINANCIAL SUPPORT ON STUDENT SUCCESS: PHASE ONE REPORT, FEBRUARY 2016* [HTTPS://WEBARCHIVE.NATIONALARCHIVES.GOV.UK/20180511112238/HTTPS://WWW.OFFA.ORG.UK/WP-CONTENT/UPLOADS/2016/11/CLOSING-THE-GAP-UNDERSTANDING-THE-IMPACT-OF-INSTITUTIONAL-FINANCIAL-SUPPORT-ON-STUDENT-SUCCESS.PDF](https://webarchive.nationalarchives.gov.uk/20180511112238/https://www.offa.org.uk/wp-content/uploads/2016/11/Closing-the-gap-understanding-the-impact-of-institutional-financial-support-on-student-success.pdf) [ACCESSED 08/05/19]

⁴¹ HATT, S., HANNAN, A., BAXTER, A. AND HARRISON, N. (2005) 'OPPORTUNITY KNOCKS? THE IMPACT OF BURSARY SCHEMES ON STUDENTS FROM LOW-INCOME BACKGROUNDS', *STUDIES IN HIGHER EDUCATION*, 30(4), PP. 373-388.

⁴² MURPHY, R. AND WYNESS, G. (2016) *THE IMPACT OF HIGHER EDUCATION FINANCE ON PARTICIPATION IN THE UK*, LONDON: CENTRE FOR ECONOMIC PERFORMANCE. [HTTP://CEP.LSE.AC.UK/PUBS/DOWNLOAD/DP1396.PDF](http://cep.lse.ac.uk/pubs/download/dp1396.pdf) [ACCESSED 08/05/19]

⁴³ WAKELING, P. (2015) *PROGRAMME ANALYSIS OF HEFCE'S POSTGRADUATE SUPPORT SCHEME. FINAL REPORT TO ESRC AND HEFCE*. SEPTEMBER 2015.

[HTTPS://WEBARCHIVE.NATIONALARCHIVES.GOV.UK/20160106165136/HTTP://WWW.HEFCE.AC.UK/PUBS/REREPORTS/YEAR/2015/PSSFINAL/TITLE_105303,EN.HTML](https://webarchive.nationalarchives.gov.uk/20160106165136/http://www.hefce.ac.uk/pubs/rereports/year/2015/pssfinal/title_105303_en.html) [ACCESSED 08/05/19]

⁴⁴ WAKELING, P., HANCOCK, S. AND EWART, A. (2017) *EVALUATION OF THE POSTGRADUATE SUPPORT SCHEME 2015/16. REPORT TO HEFCE*. AUGUST 2017. [HTTP://DERA.IOE.AC.UK/ID/EPRINT/29699](http://dera.ioe.ac.uk/id/eprint/29699) [ACCESSED 08/05/19]

2.5 Summary

A review of the UK cyber security labour market highlights the need for high-level skills (31% of businesses are not very or not at all confident in performing high-level technical tasks),⁴⁵ particularly in relation to security engineering, penetration testing and forensic analysis. Current government policy in the UK has a clear aim of developing UK talent to fill the cyber security skills gaps. However, a number of market failures exist, specifically:



- cyber security skills gaps
- lack of awareness of career and training pathways into the profession
- perceptions of the industry

A review of current government intervention shows that the cyber security postgraduate Bursaries Scheme is the only initiative that focuses on postgraduate education. It does this by providing financial support to cover the tuition fees of NCSC accredited MSc programmes. Assessment of the fit between the content of these programmes and the identified high-level skills needs shows that there is a good match between the skills needed for forensic analysis and the content of the NCSC accredited MSc in Digital Forensics. The other skills needs, however, are not so easy to map onto the range of NCSC accredited programmes. This means that employers will need to probe more deeply to better understand whether the student has the skills they need. When employers are already lacking in high-level skills this could create barriers to the employment of beneficiaries. These barriers could be overcome by **Government and education providers creating clearer pathways into the profession and clearer mapping of course material, by universities and/ or the NCSC, to the high-level skills needs (Recommendation 1)**. These findings relate to the content of the MSc programmes rather than the Bursaries Scheme but are important to note as they could potentially impact the employment of beneficiaries.

⁴⁵ IPSOS MORI (2018) UNDERSTANDING THE UK CYBER SECURITY SKILLS LABOUR MARKET
[HTTPS://WWW.IPSOS.COM/SITES/DEFAULT/FILES/CT/PUBLICATION/DOCUMENTS/2019-01/UNDERSTANDING_THE_UK_CYBER_SECURITY_SKILLS_LABOUR_MARKET.PDF](https://www.ipsos.com/sites/default/files/ct/publication/documents/2019-01/understanding_the_uk_cyber_security_skills_labour_market.pdf) [ACCESSED 08/05/19]

The research also indicates that a lack of awareness of career opportunities⁴⁶ and negative perceptions or stereotypes⁴⁷ about the sector reduces the number of people, particularly women, choosing to enter cyber security.⁴⁸ This highlights the need for government intervention to encourage more people, and women in particular, into the sector.

Research into widening participation in higher education highlights that finance is a barrier for underrepresented groups,⁴⁹ although the subject area being of interest and the perceived opportunity of getting a job/ career are more important factors in deciding what to study.⁵⁰ Research also shows that for financial assistance to be effective in widening participation, it needs to be targeted towards students with the greatest financial need.⁵¹ **DCMS should set out how it expects the HEIs to assess applicants' financial circumstances as part of the bursaries application and selection process to make sure the funds are awarded to those who need them most (Recommendation 2).**⁵²

This shows that the Bursaries Scheme has the potential to contribute to the National Cyber Security Skills Strategy by supporting the postgraduate education of UK cyber security talent, if it is targeted at those who need the funding most (meaning those from low income backgrounds and other underrepresented groups). The research shows that bursary funding does not significantly influence those outside of these groups. The factors that are most important in attracting these students are the content of the education and a link to clear career paths.⁵³

⁴⁶ ECORYS (2016) *DIGITAL SKILLS FOR THE UK ECONOMY*

[HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/492889/DCMSDIGITALSKILLSREPORTJAN2016.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492889/DCMSDIGITALSKILLSREPORTJAN2016.PDF) [ACCESSED 08/05/19]

⁴⁷ KASPERSKY LAB (2017) *BEYOND 11%: A STUDY INTO WHY WOMEN ARE NOT ENTERING CYBERSECURITY* [ONLINE] AVAILABLE AT: <https://d1srlrzdmpew.cloudfront.net/wp-content/uploads/sites/86/2017/11/03114046/Beyond-11-percent-Futureproofing-Report-EN-FINAL.pdf> [ACCESSED 15/02/2019]

⁴⁸ CENTRE FOR STRATEGY AND EVALUATION SERVICES (2018) *IDENTIFYING THE ROLE OF FURTHER AND HIGHER EDUCATION IN CYBER SECURITY SKILLS DEVELOPMENT, UNITED KINGDOM: DEPARTMENT FOR DIGITAL, CULTURE, MEDIA AND SPORT.* [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/767425/THE_ROLE_OF_FE_AND_HE_IN_CYBER_SECURITY_SKILLS_DEVELOPMENT.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767425/THE_ROLE_OF_FE_AND_HE_IN_CYBER_SECURITY_SKILLS_DEVELOPMENT.PDF) [ACCESSED 08/05/19]

⁴⁹ WAKELING, P. (2015) *PROGRAMME ANALYSIS OF HEFCE'S POSTGRADUATE SUPPORT SCHEME. FINAL REPORT TO ESRC AND HEFCE.* SEPTEMBER 2015. [HTTPS://WEBARCHIVE.NATIONALARCHIVES.GOV.UK/20160106165136/HTTP://WWW.HEFCE.AC.UK/PUBS/REREPORTS/YEAR/2015/PSSFINAL/TITLE_105303,EN.HTML](https://webarchive.nationalarchives.gov.uk/20160106165136/http://www.hefce.ac.uk/pubs/rereports/Year/2015/pssfinal/Title_105303,en.html) [ACCESSED 08/05/19]

⁵⁰ FAGENCE, S. AND HANSOM, J. (YOUTH SIGHT) (2018) *INFLUENCE OF FINANCE ON HIGHER EDUCATION DECISION-MAKING*, LONDON: DEPARTMENT FOR EDUCATION. [HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/693188/INFLUENCE_OF_FINANCE_ON_HIGHER_EDUCATION_DECISION-MAKING.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693188/INFLUENCE_OF_FINANCE_ON_HIGHER_EDUCATION_DECISION-MAKING.PDF) [ACCESSED 08/05/19]

⁵¹ WAKELING, P. (2015) *PROGRAMME ANALYSIS OF HEFCE'S POSTGRADUATE SUPPORT SCHEME. FINAL REPORT TO ESRC AND HEFCE.* SEPTEMBER 2015. [https://webarchive.nationalarchives.gov.uk/20160106165136/http://www.hefce.ac.uk/pubs/rereports/Year/2015/pssfinal/Title_105303.en.html](https://webarchive.nationalarchives.gov.uk/20160106165136/http://www.hefce.ac.uk/pubs/rereports/Year/2015/pssfinal/Title_105303,en.html) [ACCESSED 08/05/19]

⁵² THIS RECOMMENDATION WAS ACTIONED BY DCMS IN YEAR 3 OF THE BURSARIES SCHEME (AFTER THE 2 YEAR PILOT)

⁵³ FAGENCE, S. AND HANSOM, J. (YOUTH SIGHT) (2018) *INFLUENCE OF FINANCE ON HIGHER EDUCATION DECISION-MAKING*, LONDON: DEPARTMENT FOR EDUCATION. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693188/Influence_of_finance_on_higher_education_decision-making.pdf [ACCESSED 08/05/19]



3. INTERVENTION

3.1 Overview

The purpose of this section is to describe what the intervention is and how it is being implemented. It is structured under the following sub headings:

Aim	which summaries what the Scheme aims to do and how
Design	which describes the setup of the Scheme by DCMS
Implementation	which outlines how the Scheme is delivered by DCMS and the universities involved
Monitoring and Evaluation	which sets out the monitoring and reporting requirements associated with the Scheme
Summary	which presents the findings in relation to the design and delivery of the intervention

3.2 Aim of the Scheme

The aim of the postgraduate Bursaries Scheme is to address the significant and increasing mismatch in the supply of and demand for adequately skilled cyber security professionals in a short timeframe. It aims to get candidates into cyber security. It does this by offering bursaries to adults living and working in the UK transitioning into a career in cyber security through NCSC accredited MSc programmes. The bursaries are intended to cover the tuition fees associated with these courses. Upon completion, the aim is for individuals to be equipped to enter the UK job market as competent cyber security professionals, boosting the UK’s cyber capable workforce.

3.3 Design of the Scheme

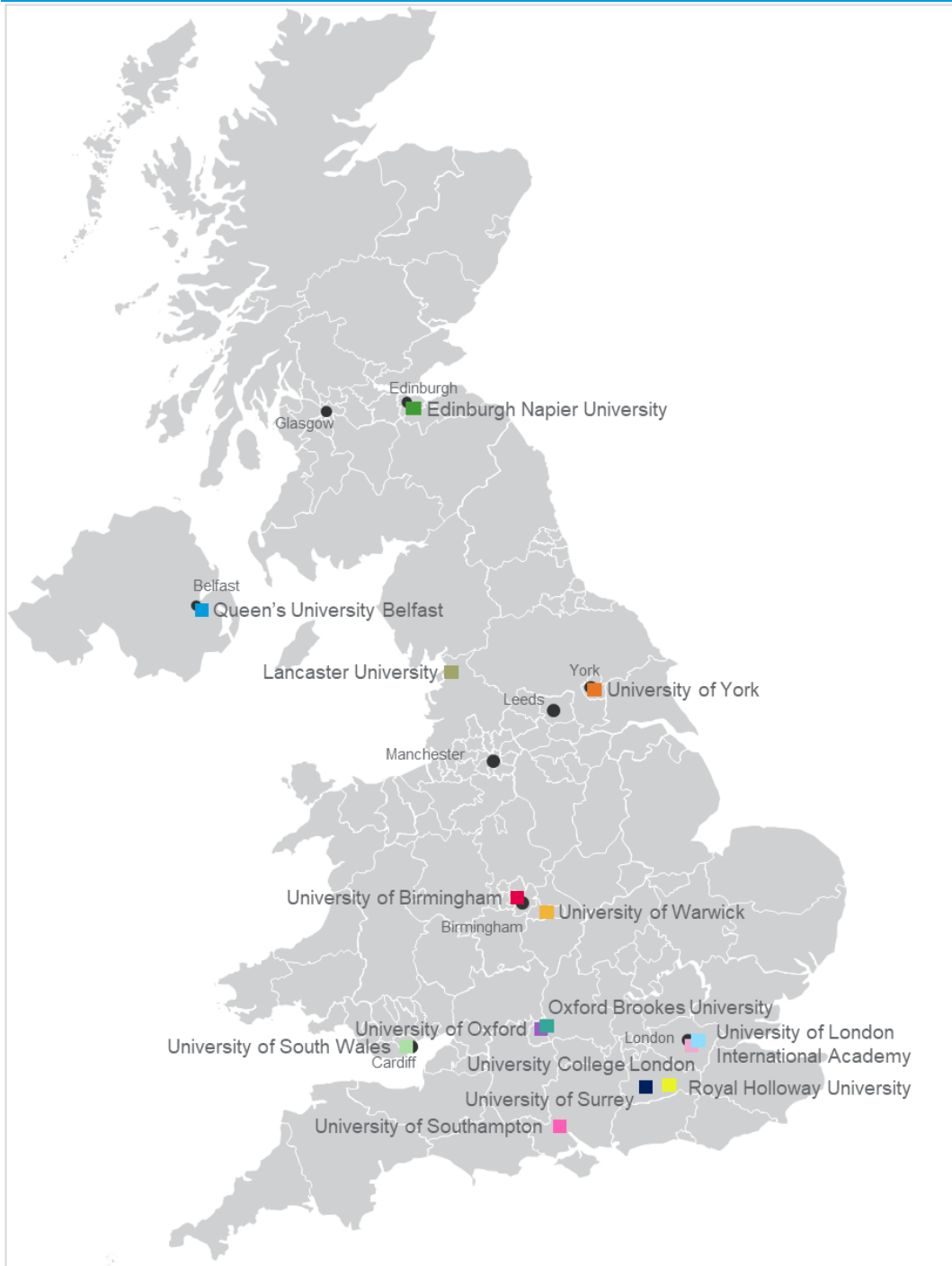
The Scheme sits within the Cyber Security Skills and Professionalisation team within the DCMS Cyber Security and Data Directorate. The Policy Lead is responsible for the day to day administration and management of the Scheme, with inputs from the DCMS finance and grants corporate function.

The decision was made by the Cyber Security Skills and Professionalisation Team to pilot the cyber security postgraduate Bursaries Scheme from 2016/17 to 2017/18 with universities who had NCSC accredited MSc programmes. In 2016 DCMS contacted all HEIs that were currently running NCSC accredited MSc programmes to ask if they would be interested in taking part.⁵⁴ 11 HEIs expressed an interest in year one (2016/17). This has increased to 14 in 2017/18, due to more HEIs gaining accreditation and expressing an interest. These universities represent roughly two thirds of HEIs with NCSC accredited MSc programmes and, as Figure 3.1 shows, they are located across the UK. As more MSc programmes become NCSC accredited, DCMS may need to introduce some form of selection criteria to determine how funding is allocated across the larger number of HEIs. Any selection criteria should consider regional or place based allocations to make

⁵⁴ AS OF FEBRUARY 2019, THERE ARE 21 UNIVERSITIES WITH NCSC ACCREDITED MSc PROGRAMMES.

sure that the opportunities for funded places are distributed equitably across the country: on a per capita basis, by skills need or by labour market demand.

Figure 3.1: Location of participating HEIs



Source: RSM analysis

3.4 Implementation of the Scheme

Each institution is responsible for managing their own application and selection process for the Bursaries Scheme. All students selected for the Scheme are expected to meet the minimum technical entry requirements for their chosen MSC programme.⁵⁵ The following DCMS selection criteria also applies:⁵⁶



- be a UK or EU citizen who is normally resident in the UK other than for the sole purpose of education
- be undertaking the NCSC accredited course and not undertaking any other forms of formal education
- have not previously held a cyber security role (cyber security functions accounted for less than 50% of any previous job role)
- be applying with an intention to retrain in cyber security (demonstrated via their application form)

In selecting the students for the bursary, HEIs were also asked to give preference to:

- persons looking to retrain into the cyber security profession, for example, returners-to-work after parental leave, those who are currently unemployed, and mid-career transitioners
- ex-armed forces personnel not already covered by any armed forces grant
- ex-police officers not already covered by any police service grant
- general IT practitioners looking to specialise in cyber security
- demographics currently underrepresented in the cyber security profession

This focus on diversity was viewed positively by the HEI and sector representatives consulted as part of this evaluation. HEIs are primarily focused on gender diversity. However, each university is managing the application and selection process differently. Some universities conduct a separate application process for the Bursaries Scheme whilst others do not and then share the DCMS allocated sum equally across all eligible candidates. This process appears to be determined by the MSc course coordinator rather than their university inclusion team. This means there is limited cross-over between the faculty and the inclusion team in terms of understanding the specific needs of those from underrepresented backgrounds. At undergraduate level it is routine for inclusion teams to work alongside student data managers and share access to institutional data sets for progress and outcome tracking. Involvement of the university inclusion team in the selection of bursary recipients could help to make sure that the bursaries are reaching the target beneficiaries.

⁵⁵ THESE ARE SET BY EACH HEI AND AVAILABLE ON THE COURSE WEBSITES

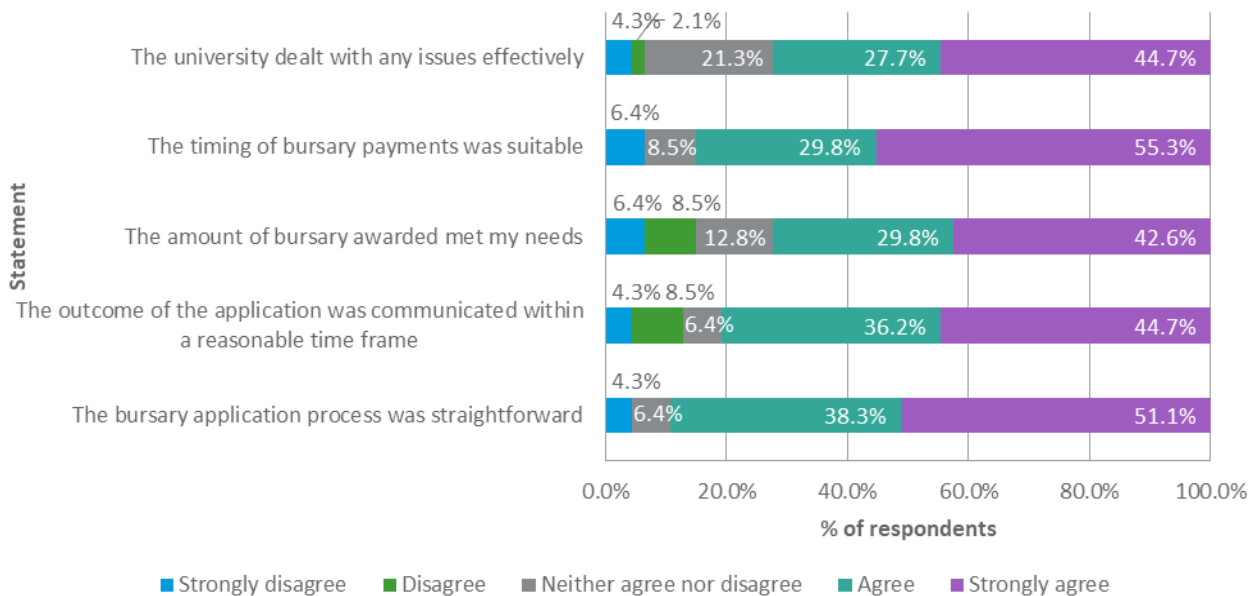
⁵⁶ 2016/17 CRITERIA ALSO INCLUDED 'NOT APPLYING FOR THIS COURSE STRAIGHT FROM AN UNDERGRADUATE DEGREE' BUT THIS CONDITION WAS LATER REMOVED FOLLOWING FEEDBACK FROM UNIVERSITIES.

The survey of bursary beneficiaries shows that they were generally positive about their experience of the application process (see Figure 3.2). The majority of respondents strongly agreed or agreed with each of the following statements:

- the bursary application process was straightforward (89.4% of respondents strongly agreed or agreed)
- the outcome of the application was communicated within a reasonable time frame (80.9% of respondents strongly agreed or agreed)
- the amount of bursary awarded met my needs (72.4% of respondents strongly agreed or agreed)
- the timing of bursary payments was suitable (85.1% of respondents strongly agreed or agreed)
- the university dealt with any issues effectively (72.4% of respondents strongly agreed or agreed)

Less than 15% of the 47 respondents either strongly disagreed or disagreed with each of the above statements. Respondents were slightly more likely to disagree or strongly disagree that the amount of bursary awarded met their needs, suggesting some degree of need remains unmet (14.9% of respondents either disagreed or strongly disagreed with this statement).

Figure 3.2: Application Process - Beneficiary survey



Base: 47

DCMS undertook a minimal communications campaign in 2016 to promote the Scheme to its stakeholders. The promotion of the Scheme to students was primarily left to the HEIs. Sector representatives indicate that the Bursaries Scheme is good publicity for the Master's programmes more generally and could encourage people to apply whether they received a bursary or not.

DCMS communicates the allocated sum to each institution in March and April each year in line with the beginning of its financial year. The majority of HEIs said that the timing of these communications and that of their MSc application process, limited the amount of publicity and marketing they could do about the Bursaries Scheme to the target groups. This could be affecting demand for the Scheme, particularly from underrepresented groups:

“If the bursary is going to influence people’s decisions we need to get the information out as soon as possible.” (HEI representative)

It is interesting to note that Wakeling et al.'s (2017) evaluation of the 2015/16 HEFCE postgraduate student support scheme identified the same flaw in the design of that scheme, suggesting a mismatch between academic recruitment timeframes and the timing of public sector funding announcements⁵⁷. The student survey findings indicate that almost half of beneficiaries (44.7% of survey respondents) were not aware of the Bursaries Scheme until after they had been accepted onto the cyber security postgraduate programme. As both timeframes are dependent on larger institutional factors neither is likely to change. Therefore, DCMS and the universities involved should look for alternative methods of promoting the Scheme and making potential applicants aware of the support available. For example, the consultations with sector representatives suggest that using the National Union of Students to promote the Bursaries Scheme to its members via affiliated hacking clubs and societies and by signposting the Scheme via the NCSC, Women's Security Society and other industry representatives' websites. Although this approach is untested it seems a logical.

Costs incurred by the HEIs in administering the Scheme include:

- cost of academic staff time to assess applications and communicate with applicants (c.4-5 days)
- cost of administration staff time to administer the bursaries, comply with DCMS requirements (such as contracting, assurance of student health and safety) and provide necessary monitoring and reporting information (c.3-5 days)
- top-up of bursaries (if applicable see Section 4)

The HEI consultations indicated that the commitment of staff time was slightly higher for this Scheme compared to other bursary schemes for which the universities had existing templates and reporting tools. However, they considered this to be appropriate to the level of funding awarded and the fact that this is a pilot scheme.

⁵⁷ WAKELING, P., HANCOCK, S. AND EWART, A. (2017) EVALUATION OF THE POSTGRADUATE SUPPORT SCHEME 2015/16. REPORT TO HEFCE. AUGUST 2017. <http://dera.ioe.ac.uk/id/eprint/29699> [ACCESSED 08/05/19]

3.5 Monitoring and reporting

DCMS is responsible for monitoring the progress of the Scheme. To provide proof-of-principle of the 2 year pilot, universities are required to report to DCMS, quarterly, on 3 main areas:



DCMS also collects informal feedback from the HEIs at appropriate points throughout the year. This has led to changes to the Scheme, for example, expanding the award criteria in 2017/18 to allow recent undergraduates to apply for a bursary.

The HEIs consulted commented that, compared to other bursary schemes, the DCMS bursary requires quite a lot of bespoke reporting (for example breakdowns by gender) which can involve a lot of ad hoc administration and asked for as much lead in time for such requests as possible.

Over the course of the pilot it has been identified that there is a lack of consistent management information held by the universities beyond the figures reported to DCMS (see Section 4) and very limited destination data or contact details that would enable follow up research. DCMS should set clear objectives covering the data it expects universities to collect and keep, including:

- total number of applications to the MSc programme by academic year (broken down by gender and ethnicity)
- total number of students awarded a place on the MSc programme by academic year (broken down by gender and ethnicity)
- number of eligible students awarded a place on the MSc programme by academic year (broken down by gender and ethnicity)
- number of applications to the Bursaries Scheme by academic year (broken down by gender and ethnicity)
- number of bursary recipients by academic year (broken down by gender and ethnicity)
- number of bursary recipients who have withdrawn, dropped out or failed the MSc programme by academic year (broken down by gender and ethnicity)
- number of bursary recipients who have completed the MSc programme by academic year (broken down by gender and ethnicity)
- number of bursary recipients who have got a cyber security job by academic year (broken down by gender and ethnicity)
- total number of students on the MSc programme who have got a cyber security job by academic year (broken down by gender and ethnicity)

- number of students on the MSc programme who were eligible for a bursary who have got a cyber security job by academic year (broken down by gender and ethnicity)

In the absence of an existing logic model for the Scheme we have developed the following model (see Table 3.1), which should be used to measure the impact of the Scheme in the future.

Table 3.1: Bursaries Scheme logic model

Inputs	Activities	Outputs	Outcomes	Impacts
<ul style="list-style-type: none"> • DCMS Funding (£1m) • Staff time – DCMS/ HEI for management and administration 	<ul style="list-style-type: none"> • Small communications campaign • Setting up processes to administer the Scheme • University advertising of bursaries • Funding dispersed 	<ul style="list-style-type: none"> • No. of applications to the Bursaries Scheme per annum (pa) by gender and ethnicity • No. of bursary recipients pa by gender and ethnicity • No. of bursary recipients who have withdrawn, dropped out or failed the MSc programme pa by gender and ethnicity • No. of bursary recipients who have got a cyber security job pa by gender and ethnicity 	<ul style="list-style-type: none"> • Increase the proportion of UK students on the MSc programmes • Increase in the gender diversity of UK students on the MSc programmes • Increase in the ethnic diversity of UK students on the MSc programmes • Improved mapping of MSc programmes to skills needs 	<ul style="list-style-type: none"> • Increased number of highly skilled UK cyber security professionals • Increase in the diversity of highly skilled UK cyber security professionals

We recommend that DCMS conducts follow up research with beneficiaries in 3 to 5 years, to better understand the impact the Bursaries Scheme has had on their career. We acknowledge that this will be difficult, given the current lack of a reliable means of contacting beneficiaries once they graduate. We, therefore, recommend that DCMS establishes a beneficiary community perhaps using social media, such as LinkedIn or WhatsApp. In addition to facilitating further research with these individuals this will create a virtual community of cyber security professionals from currently underrepresented groups that could act as a valuable peer group network for users.

3.6 Summary

The Bursaries Scheme was developed to address the mismatch between the supply of and demand for appropriately skilled cyber security professionals whilst improving diversity within the sector. It is part of a range of DCMS pilot schemes to test different approaches to retraining career transitioners. The Scheme provides bursaries to students living and working in the UK who are transitioning to a career in cyber security through a NCSC accredited MSc programmes. Linking the Scheme to NCSC accredited programmes shows a joined-up approach by government and sends a clear message to students and industry about the standard of these programmes. As more courses become NCSC accredited it may be necessary to introduce some form of selection criteria to determine the allocation of funding between a larger number of HEIs. **Recommendation 3: DCMS should consider regional or place based allocations to make sure that the opportunities for funded places are distributed equitably across the country.**

The timing of DCMS confirmation of funding to each HEI and postgraduate recruitment timeframes has resulted in limited promotion of the Bursaries Scheme to date. This has negatively affected the ability of the Scheme to attract people, particularly from the target groups, to do a Master's in cyber security. As both timeframes are dependent on larger institutional factors neither is likely to change. Therefore, **Recommendation 4: DCMS and the universities involved should consider alternative methods of promoting the Scheme and making potential applicants aware of the support available.** For example, using the National Union of Students to promote the Bursaries Scheme to its members via affiliated hacking clubs and societies and by signposting the Scheme via the NCSC, Women's Security Society and other industry representatives' websites.

There is currently a lack of consistency in how universities select bursary recipients. While this is acceptable for a small-scale pilot, **Recommendation 5: DCMS should set out a clear policy for how it expects universities to apply the selection criteria, and the extent to which university inclusion teams should be involved in this process, to make sure that the bursaries are reaching the target beneficiaries, including those from ethnic minority backgrounds.** Greater consistency in the selection processes of HEIs would also help contribute to a future effectiveness evaluation.

There is also a lack of consistent management information held by the universities. We recommend that **DCMS sets clear objectives covering the data it expects universities to collect and keep (Recommendation 6); and Recommendation 7: DCMS considers establishing a beneficiary community to enable long term follow up research and create a virtual community of cyber security professionals from currently underrepresented groups.**



23.7%

of beneficiaries are female



71.7%

of survey respondents thought that completing the MSc has helped (or will help) to get a cyber security job



66.6%

of the nine beneficiaries who completed their MSc got a cyber security job or went on to further study in the sector



4. PERFORMANCE

4.1 Overview

The purpose of this section is to assess the performance of the pilot. It is structured under the following sub headings:

- Bursaries awarded – *which outlines the profile of bursary beneficiaries*
- Effectiveness⁵⁸- *the extent to which the Scheme has been effective in attracting candidates to study NCSC accredited MSc programmes and the extent it was effective in getting beneficiaries into cyber security roles*
- Benefit to recipients – *which summarises the relative value of the bursary to recipients, what else it enabled beneficiaries to spend their money on and other outcomes from the MSc programme*
- Additionality – *which assesses the extent to which the above outputs and outcomes happened because of the Bursaries Scheme and would not have happened otherwise*
- Summary – *which presents findings on the performance of the intervention in relation to the first 2 research questions outlined in the terms of reference*

Due to the length of this section we have included key findings at the end of each sub section.

4.2 Bursaries awarded

In line with rules around disclosure of funding amounts under the National Cyber Security Programme some financial information, including assessment of value for money, is not included in this published version.

Analysis of DCMS monitoring information on the number of bursaries funded by year at each university along with the number of women sponsored and the number who are progressing well (meaning still actively engaged and progressing their studies), indicates that to date 118⁵⁹ people have benefited from the Scheme and that 23.7% of beneficiaries are female. This links to the aims of encouraging more candidates into cyber security through a NCSC accredited MSc programme and encouraging more diversity. It should be noted that DCMS does not currently collect data on the ethnicity of beneficiaries, but the logic model developed as part of this evaluation recommends it is captured in the future.

Consultations with HEIs and beneficiaries also indicate that the Scheme is encouraging career transitioners. In comparison to the wider cohort of students on the NCSC accredited MSc programmes, which includes a large proportion of international/ EU students who are recent graduates, applicants for the Bursaries Scheme are UK or EU citizens who normally reside in the UK and generally have an IT or IT admin background. Some also have elements of cyber security as part of their job:

⁵⁸ THE EXTENT TO WHICH THE INTERVENTION HAS MET ITS OBJECTIVES (SOURCE: HM TREASURY (2011), THE MAGENTA BOOK: GUIDANCE FOR EVALUATION. [ONLINE]. AVAILABLE AT: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/220542/magenta_book_combined.pdf [ACCESSED 22/03/2019].)

⁵⁹ THIS DOES NOT INCLUDE THOSE WHO HAVE DROPPED OUT. DCMS CONFIRMED THAT A TOTAL OF 8 PEOPLE HAD DROPPED OUT ACCORDING TO THE MONITORING DATA RECEIVED AS OF 30 JANUARY 2019.

“Applicants [for the bursary] were generally more experienced than the wider MSc cohort, people with around 10 years’ experience in a technology/ software development background, who had done an undergraduate degree in computer science. They were also skewed towards part-time study.” (HEI representative).

It is also interesting to note that, based on the survey responses, beneficiaries of the Scheme appear to be well educated, with 26.7% of respondents having already achieved a Master’s level qualification before applying for the MSc programme. While survey respondents were not asked to disclose the subject matter of this qualification, anecdotal evidence from consultations with HEIs and the beneficiary case studies, suggests that this was often in an IT related subject.

The Scheme aims to increase the number and diversity of UK cyber security professionals - diversity has primarily been focused on attracting more women into the sector. It is not possible to comment on the Scheme’s performance against targets in relation to the total number of bursaries distributed or the number of women supported because no targets were set. DCMS is using this pilot Scheme to test what appropriate and precise targets may be.

Based on the evidence from the HEI consultations the proportion of females who applied for the Bursaries Scheme was typically lower than or comparable to the MSc programme in general (20% to 25% compared to 20% to 30%). This was said to be because of the ineligibility of international students. Analysis of DCMS monitoring information shows, that some universities are performing well in terms of the proportion of females sponsored (87.5% of beneficiaries from Royal Holloway were female; 42.9% of beneficiaries from University of London International Academy were female; and 37.5% of beneficiaries from University of Surrey were female).⁶⁰

Royal Holloway and University of London International Academy’s success in supporting a higher proportion of female recipients is likely to be linked to the relatively large size of their MSc programme (c.300 students), meaning they have more eligible female applicants to choose from. The University of Surrey has a comparatively smaller cohort of MSc students (c.25) but noted a slightly higher proportion of female applicants. However, as the university does not publicise the bursary, the higher level of female applicants cannot be linked to the Scheme.

The consultations indicated that the Scheme has helped to improve diversity:

“The profession is aware of the lack of diversity. It [the Scheme] has encouraged other institutions to tackle it. In the short term a few more women are joining the sector due to the funding. They will become role models which will have a bigger impact in the future, leading to increased diversity.” (HEI representative)

During the pilot, bursaries were awarded to 118 people, including 28 women (23.7%). This is in line with HEI representatives’ estimates about the number of females who applied to the Bursaries Scheme (20% to 25%). This suggests that the Scheme is helping to support more women to enter the sector.

⁶⁰ IT IS A PRINCIPLE OF FUNDING THROUGH THE NCSP THAT THE DETAIL OF INDIVIDUAL NCSP FUNDS SHOULD NOT BE MADE PUBLIC FOR NATIONAL SECURITY REASONS. FOR THAT REASON, ONLY HIGH-LEVEL ANALYSIS OF THIS INFORMATION IS PRESENTED.

“It is a very positive Scheme. Very happy to see more diversity due to bursary facilitating access to MSc programme.” (HEI representative)

4.3 Effectiveness

4.3.1 Has the Scheme attracted candidates to the MSc programmes?

Sector representative feedback: Sector representatives were generally supportive of the Scheme as a short term intervention to address the shortfall in cyber security professionals and help promote the NCSC accredited MSc programmes as one pathway into the profession. They also felt that receiving support for the full or partial costs of tuition fees was an appropriate means of doing this. Although in the longer-term consultees felt that individuals stood to benefit sufficiently from participation in Master’s programmes without the need for further incentives. Therefore, the Scheme will lose its relevance as the gap is addressed.

HEI feedback: Due to the low volume of bursaries awarded to date, it is difficult to draw firm conclusions on the impact that this Scheme has had on demand for postgraduate study in cyber security. With the exception of one HEI, where everyone who was eligible received a partial bursary, bursary beneficiaries typically represent a relatively small proportion of students enrolled on the MSc programme.

Some HEIs noted a growing demand for their cyber security postgraduate programme due to, “A general awareness of cyber security as a career pathway” (HEI representative). Others felt the Bursaries Scheme has increased awareness of cyber security as a profession:

“Advertisement of the Bursaries Scheme and its association with Government strategy, DCMS, the NCSC and the professionalisation of the sector has increased awareness of cyber security as a profession.” (HEI representative)

There is, however, anecdotal evidence from HEI representatives that the Bursaries Scheme has generated interest in the MSc programmes from students and industry and that failure to receive a bursary does not necessarily stop people from applying to or completing the Master’s programme:

“Bursaries are effective in encouraging people to apply” (HEI representative)

“It is likely that we have one or 2 more home students than we would have been likely to get. Home students are very important in computing.” (HEI representative)

“The Scheme has worked to influence career transitioners to undertake an MSc, but it’s difficult for them. They have to balance kids, jobs, commute.” (HEI representative)

This demonstrates the benefit of promoting the Scheme to help raise awareness of cyber security postgraduate education amongst potential beneficiaries.

Some HEI representatives also cited reputational benefits of being linked to DCMS and being seen to be supporting underrepresented groups. The Scheme was also said to improve the student experience for beneficiaries by providing them with financial assistance and allowing them to focus on their studies rather than their finances. It is reasonable to assume that this could potentially lead them to encourage other UK based students to do the course.



MORE TIME AND FREEDOM TO LEARN

Beneficiary case study

Rachel is a 25 year old British African female, living in London. She has an undergraduate degree in Maths and worked as an IT Analyst in a financial firm for a year prior to undertaking her Master's degree.

I would not have had the time to study without the bursary

As an IT Analyst I had some exposure to cyber security and I wanted to learn more. After a bit of research I knew the industry was growing and it has a focus on trying to attract more women. The course was a perfect opportunity, however I would have found it difficult to cope full-time without the bursary. The bursary allowed me focus on the work involved in my course, as such, I had more time to study and did not have to take on any more university debt.

As a result of the training I received I have secured a job as a Security Consultant Analyst at a leading management consulting company. The role itself will involve more training and allow me to develop my skills further. I have also made connections with other women in cyber security through the Master's course and we hope to start our own security software project.

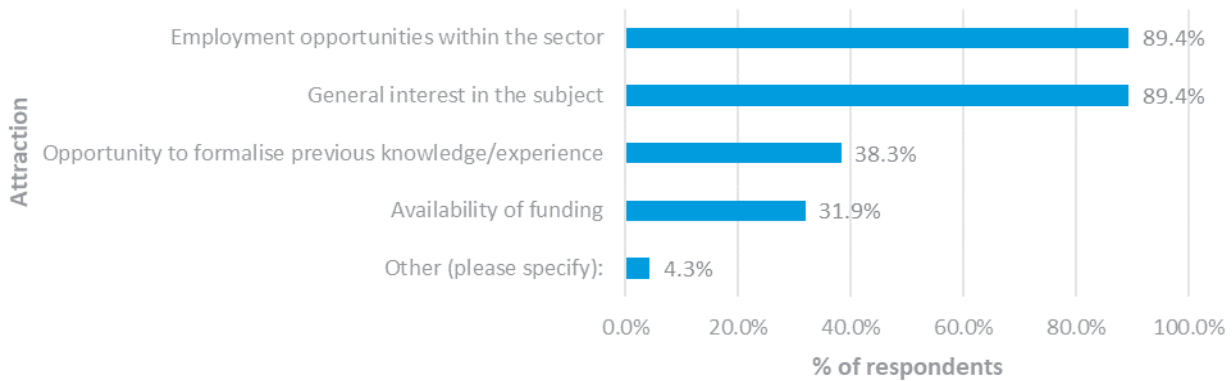
I hope to continue to have a long career within cyber security.

Note: the case studies developed as part of this evaluation are based on actual beneficiaries, but their names have been changed to protect their anonymity

Bursary applicant feedback: Figures 4.1 and 4.2 illustrate what attracted people to apply for the cyber security postgraduate programme. These show that, in total 89.4% of respondents to the beneficiary survey were attracted to the postgraduate programme due to employment opportunities within the sector, and an interest in cyber security. Similar findings were evident in the control group with employment opportunities within the sector (65.7%) and general interest in the subject (61.2%) being the most popular responses. In the control group survey, however, a higher proportion of respondents selected 'opportunity to formalise previous knowledge/ experience' as what attracted them to the postgraduate programme (49.3%), compared to beneficiary respondents (38.3%). This may be linked to the Scheme's selection criteria and the fact that bursary recipients cannot be currently employed in a cyber security role. It does however highlight that there are people in cyber security who feel the need for extra education in the area.

It is interesting to note that availability of funding attracted 31.9% of the beneficiaries surveyed and 22.4% of those in the control group. This suggests that the Scheme may have had some positive impact on demand for the postgraduate programmes.

Figure 4.1: What attracted you to the postgraduate programme? – Beneficiary survey



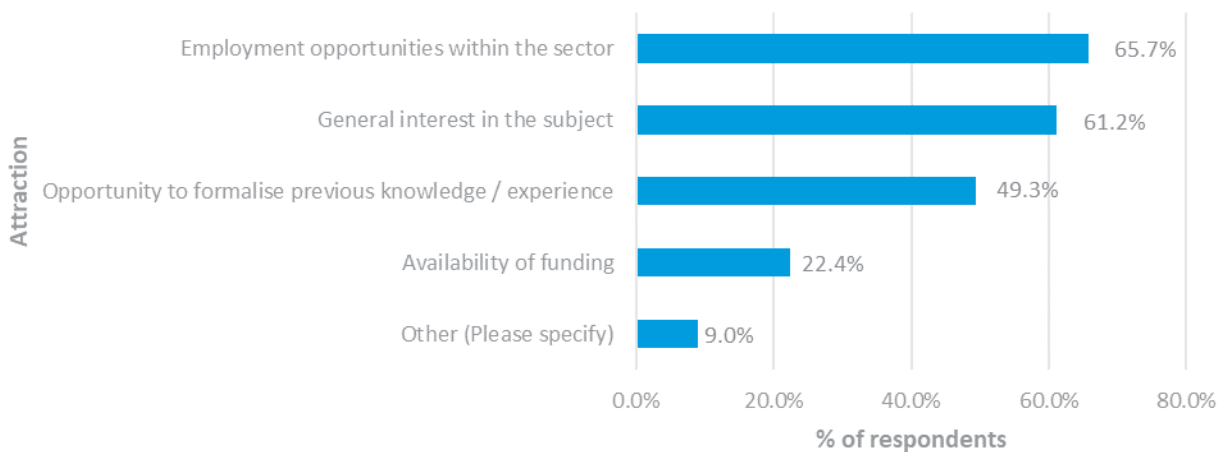
Base: 47

Note: this was a multiple-choice question. 47 respondents submitted 119 responses in total

The response options for this question were set to appear in a random order to help avoid bias

Two respondents to the beneficiary survey selected ‘other’ as an answer to this question, one indicating that furthering their career with their current employer and the other stating that furthering their knowledge in a field they wanted a career in as what attracted them to a postgraduate in cyber security.

Figure 4.2: What attracted you to the postgraduate programme? – Control group



Base: 67

Note: this was a multiple-choice question. 67 respondents submitted 139 responses in total

The response options for this question were set to appear in a random order to help avoid bias

Six respondents to the control group survey answered 'other' to this question. Their responses included:

- networking opportunities
- want to address a gap in the sector (educate/ enthuse others)
- recommendation from previous graduate of the course
- lost a lot of money in an online scam
- an opportunity to apply my knowledge from studying law alongside my interest in technology/ cyber security whilst learning the fundamentals
- interest in further research degree



WANTED A COMPETITIVE ADVANTAGE

Beneficiary case study

Laura is a 49 year old white female from Northern Ireland. She has a degree in Mathematics and MSc in Mathematics and Computer Science. Laura has over 20 years experience in IT having started her career as a software developer and, more recently, moved into IT project management.

I had been thinking about doing some kind of training to give myself an advantage in the market place. I had the time to take on training courses. I considered the various topics that are hot right now in technology, cyber, blockchain etc and cyber security seemed like the best fit for me.

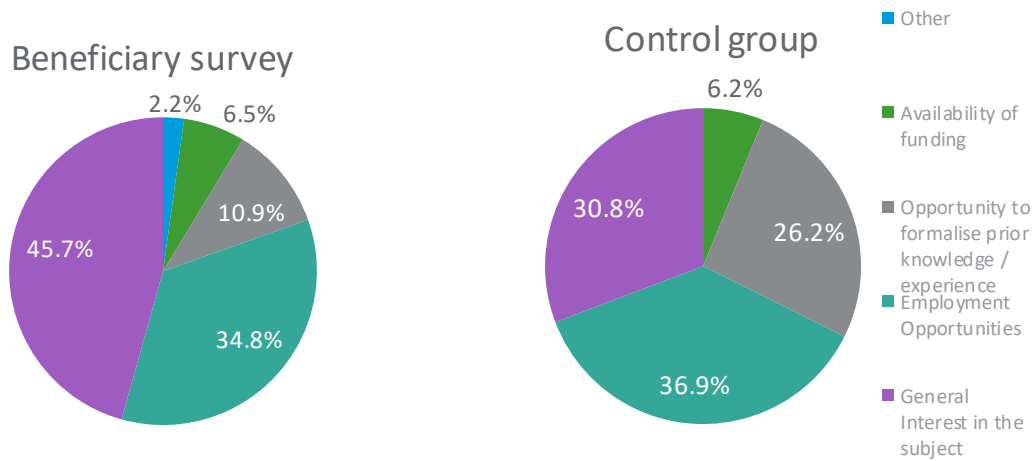
I researched the various training courses available; £7.5k for a two year MSc programme seemed like better value to me than £2k for a certificate that took a week to get. I didn't know about the bursary when I applied to the programme. I probably would have had to take out a loan to cover most of the fees anyway, but then fees for the new Applied Cybersecurity course increased to £12.5k. I definitely couldn't have afforded that, therefore, the bursary reduced this financial pressure.

I graduated in December 2018 and have just been offered a job in a UK technology consultancy firm. My new role combines cyber security with project management. It is exactly what I was looking for. The project management work I had been doing didn't involve anything technical. My new role will involve a strong technical element. The MSc obviously contributed towards my successful application to this role.

The bursary took the pressure off

When asked which of these factors most attracted them to apply to the postgraduate programme, general interest in the subject was the most popular answer for respondents to the beneficiary survey (45.7% of respondents). The most popular answer from respondents in the control group was employment opportunities (36.9% of respondents). It is interesting to note that less than a tenth of respondents to either survey said that availability of funding was what most attracted them to the postgraduate programme (6.5% of beneficiary respondents and 6.2% of respondents in the control group). **This supports the findings of the literature review that while financial assistance is important to recipients it is a secondary factor in study decisions.**


Figure 4.3: What most attracted you to the postgraduate programme?



Base: 46

Base: 65

Note: totals do not sum to 100% due to rounding



TURNING A PASSION INTO A NEW CAREER PATH

Beneficiary case study

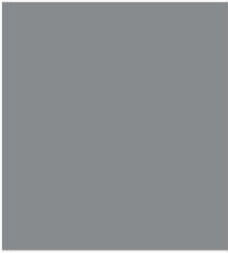
Sophia is a 38 year old white female. Originally from Greece, she now lives in the North West of England . She has a degree in Electrical and Computer Engineering and 10 years experience as a Software Engineer. In this role, her main responsibilities were: Business Analysis, Functional Design and Project Management.

It's never too late to learn new things and gain new skills and experiences

During the last three years of my employment I was assigned to a position that introduced me to Information Systems Security and Privacy. I developed a passion and real interest for the security field. This led me to believe that a postgraduate qualification in security, combined with my skills and 10 years' work experience, would be worthwhile for me professionally.

Without the bursary I would have to find alternative ways to fund my course. Now, I didn't have to get any loans, which is very helpful. I am studying the MSc programme full time. I am not currently employed, since the programme is very demanding.

I want to work in the cyber security sector because I believe that it is a profession with many opportunities now and in the future. After the course is over I will pursue a cyber security job.



OPENING UP NEW CAREER OPTIONS

Beneficiary case study

Monica is a 50 year old white female residing in London. She had 18 years experience as an IT manager prior to undertaking her postgraduate degree.

Cyber security is always an area I had been interested in during my years as an IT manager. After I had been made redundant at my previous job it gave me the freedom to pursue this specialism. With some help from British Computer Society, I applied for the bursary and was luckily accepted onto the full-time course.

The bursary very quickly made a huge impact on my employability and I now have a job as an Information Governance Officer at a charity. I plan to continue working, developing my skills and perhaps adding to my academic qualifications with a PhD.

The Postgraduate degree has opened the rapidly changing world of cyber security, and I can see that because it is so important to everything now, there are lots of career choices and options.

Cyber security is so important now and there are lots of choices

A large proportion of our survey respondents were attracted to the Master's programmes by employment opportunities within the sector and a general interest in the subject (89.4% and 89.4% of the beneficiary respondents and 65.7% and 61.2% of the control group respectively). However, the availability of funding via the Bursaries Scheme did attract a small proportion of survey respondents to apply for the postgraduate programme (31.9% of respondents to the beneficiary survey and 22.4% of the control group).

4.3.2 Are beneficiaries getting into cyber security roles?

The sector representatives we consulted felt that the outcomes of the Bursaries Scheme should be measured in terms of the number of beneficiaries who go on to become UK cyber security professionals. Universities should, therefore, be held accountable for collecting this information for DCMS and it should be collected consistently across the sector. It is interesting to note that 10 respondents to the beneficiary survey have already got a job in cyber security as a result of the course despite the majority of respondents not having completed it yet, suggesting that targeting career transitioners helps people to secure employment more quickly (6 respondents secured employment in the sector before the end of their MSc). This is supported by anecdotal evidence from the HEI consultations:

“Most bursary students have secured a cyber role. Two are doing the MSc as career development and will return to a role with their employer that has some cyber security elements. Two are shifting career to a cyber role. One is doing a PhD in Cyber” [and one is unknown]. (HEI representative)

“Three beneficiaries have completed the programme. Two were awarded an MSc and one received a postgraduate certificate. The two who received the MSc became an Information Security Analysis and Penetration Tester. The destination of the third is unknown.” (HEI representative)

“Middle management people have gone on to cyber security roles. Others are moving from software development to cyber security jobs. One is a cyber security lead.” (HEI representative)

“All except one bursary student went on to work in cyber security (they went into software development). These jobs did not necessarily require an MSc, but most will look for MSc level applicants.” (HEI representative)

“Most beneficiaries were employed in the IT industry and want to or have already transitioned into a cyber role.” (HEI representative)

“Four [out of eight] beneficiaries have secured employment in a cyber security role.” (HEI representative)

“All eight bursary students, who completed their MSc, are employed in the sector. One, who had a high-profile cyber role, is coming back [to the university] to do a PhD in cyber security.” (HEI representative)

However, one HEI representative felt that a lot of organisations, including Government Communications Headquarters (GCHQ), are keen to take top of class IT professionals and train them up themselves. Suggesting that more needs to be done to raise awareness amongst some employers of the benefits of postgraduate study. For example, sharing case studies and success stories.



UPSKILLING LED TO A NEW CAREER PATH

Beneficiary case study

Paul is a 47 year old white male living in the East of England. He has a BSc in Computer Science and over 20 years' experience of working in IT, most recently as Technical Lead for IT projects for a government department.

I'm so excited about my new career

I didn't think I knew enough about security. I intended to upskill myself in cyber security and return to the same job in IT. I had no prior experience in cyber security. I applied for the MSc programme on a part-time basis. The taught element of the programme was delivered through weekly modules allowing me to limit the amount of time I needed to take off work. I didn't find out about the bursary until after I was accepted onto the programme. I would have done the MSc anyway, but the bursary meant I could use the money I would have spent on fees to cover travel and accommodation costs instead.

I have completed the taught element of my MSc course and am currently finalising my project, however, I have been lucky enough to get a job as a Security Architect for a UK based digital technology firm. I wouldn't have got the job without undertaking the MSc. My plan is to finish the MSc and pursue a career that involves cyber security.

One sector representative also felt that the outputs of the MSc programme for bursary beneficiaries could feed into national research priorities by encouraging beneficiaries to choose a dissertation topic that is aligned to the National Cyber Security Strategy. Depending on the overall scale of the Scheme in the future, bursary beneficiaries could potentially be paired with a DCMS or the NCSC sponsor who could participate in that student's supervisory meetings to make sure the research is aligned to government research interests.

When we consider the 9 respondents to the beneficiary survey who completed their MSc we found:

- six respondents said they had achieved a Level 7 qualification (66.7%)
- four respondents had got a job in cyber security (44.4%)
- two respondents said it led to further study in cyber security (22.2%)
- one said it led to further study in another sector (11.1%)
- no respondents had obtained a job in another sector

This shows that 6 of the 9 respondents (almost two thirds) are either employed in cyber security or undertaking further studies in the sector.

The majority of respondents to the beneficiary survey agreed or strongly agreed that completing the course has helped or will help them to get a job in cyber security (71.7%). Only 13.0% of respondents disagreed or strongly disagreed that completing the course has or will help them to get a job in cyber security. As Table 4.1 shows, male respondents were more likely to strongly agree than female respondents (68.0% compared to 35.0%), indicating more confidence in their ability to secure employment.

Table 4.1: Will the course help you get a job in cyber security? - Beneficiary survey

To what extent do you agree that completing the course has helped (or will help) you to get a cyber security job?	Male	Female	All (%)	Total
Strongly disagree	4.0%	5.0%	4.3%	2
Disagree	4.0%	10.0%	8.7%	4
Neither agree nor disagree	4.0%	10.0%	8.7%	4
Agree	16.0%	30.0%	21.7%	10
Strongly agree	68.0%	35.0%	50.0%	23
Don't know	4.0%	10.0%	6.5%	3

Base: 46 (25 male, 20 female and one not answered)

The 6 respondents who **disagreed or disagreed strongly** were asked how the course could be improved to help students secure a cyber security job.⁶¹ There were 3 responses to this question, these responses suggest the impacts of the MSc programmes could be improved by more explicitly linking the knowledge taught in the MSc programme to its practical application.

The 33 respondents who **agreed or agreed strongly** were asked, which aspects of the course have helped (or will help) you to get a cyber security job. 30 respondents gave 61 answers to this question. These are summarised in Table 4.2 overleaf.

⁶¹ THESE RESPONDENTS WERE NOT ALL FROM THE SAME UNIVERSITY



RETRAINED TO MEET MARKET DEMAND

Beneficiary case study

Peter is a 50 year old white male. Originally from Bulgaria he currently lives in the East of England and has UK nationality. Before taking part in the MSc programme he had already achieved a HNC Electrical and Electronic Engineering and a BEng(H) Electrical and Electronic Engineering Technology.

Every business needs cyber security expertise

I worked in the UK electronics manufacturing industry for 15 years. Over the years electronics engineering has moved closer to computing. I knew that cyber attacks are on the increase and more companies are looking for specialists in the field.

I had previously completed a group project for ICT hardware obsolescence for Airbus, Filton and some internet electronics.

I signed up to do a full time postgraduate degree in cyber security. The bursary covered my tuition fees only.

I have completed my first taught semester of the MSc Programme and am currently looking for future research or employment opportunities in cyber security. My long term plan is to find a job in cyber security.

Table 4.2: Which aspects will help get a cyber security job? - Beneficiary survey

	%	Total
Specific module	49.2%	30
Multi-disciplinary nature of the course	13.1%	8
All aspects of the course	11.5%	7
Reputation/ accreditation of the course	6.6%	4
Technical understanding and awareness of threats and issues in cyber security and how to mitigate them	4.9%	3
Practical experience	4.9%	3
Other	4.9%	3
Access to industry experts/ networking opportunities	4.9%	3

Base: 30


Note: specific modules listed by respondents included: business and governance, cryptography, forensic investigation Information security management, law, malware, network security, organisation risk management, penetration testing, secure programming, secure system design and system security.

Beneficiaries are getting cyber security jobs. This is based on survey evidence, consultations with HEIs and beneficiary case studies. 66.6% of the nine beneficiaries who had completed their MSc are currently engaged in the sector. The majority of beneficiaries felt that completing the course would help them to get a cyber security job (71.7%).

4.4 Benefits to recipients

4.4.1 Value of the bursary

The mean proportion of total income that was/ would have been derived from the bursary is similar in both surveys; 45.8% in the beneficiary survey and 52.9% in the control survey⁶².



BETTER UNDERSTANDING OF UNDERLYING COMPUTER SCIENCE

Beneficiary case study

Kyle is a 22 year old Asian British male from the East of England. He has a BSc in Computer Game Technology.

I enjoyed video games and making them. During the second year of my undergraduate degree I had a bit more time to reflect, I started looking into security and doing a bit in my free time and picked a topic related to security for my final project. I enjoyed it more than game development.

I thought the MSc would help me to pursue a career in cyber security. The bursary did influence my decision about where to apply. Without it I couldn't have afforded to leave my parents' house. It also meant I could afford better computing equipment for my studies.

I'm currently in my second term. After I graduate I plan to go into industry and maybe start my own business one day.

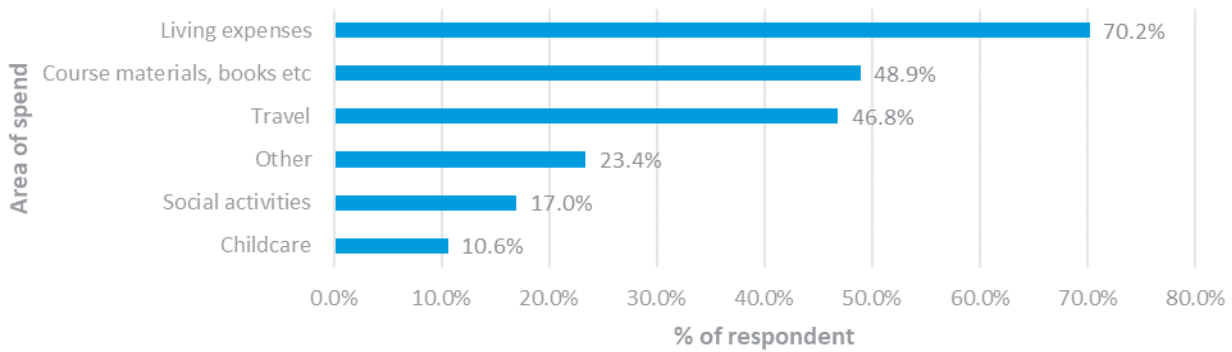
The bursary has given me more independence

We were interested to understand what impact the bursaries had on beneficiaries, meaning what else receipt of the bursary enabled (or would have enabled) applicants to spend their own money on. As shown in Figures 4.4 and 4.5 overleaf, course materials, books etc and living expenses were the top 2 responses in both the beneficiary and control group surveys. 70.2% of respondents to the beneficiary survey selected living expenses as what the bursary enabled them to spend money on, compared to 59.7% of the respondents to the control group survey. Conversely, 70.1% of the respondents to the control group survey indicated that the bursary would have enabled them to spend money on course materials, books etc, compared to just 48.9% of respondents to the beneficiary survey. Respondents to the beneficiary survey were also more likely to indicate that the bursary enabled them to spend money on social activities (17% of respondents), than respondents to the control group survey (7.5% of respondents). It is interesting to note that there appears to be a mismatch between how people thought they would spend their money and how they did spend it.

Figure 4.4: What did the bursary enable you to spend money on – Beneficiary

⁶² IN BOTH SURVEYS, THE MAXIMUM PROPORTION OF TOTAL INCOME DERIVED FROM THE BURSARY WAS / WOULD HAVE BEEN 100.0%, MEANING THERE ARE RESPONDENTS FOR WHOM THE BURSARY WAS OR WOULD HAVE BEEN THEIR FULL INCOME. THE MINIMUM PROPORTION OF TOTAL INCOME DERIVED FROM THE BURSARY WAS 2.0% IN THE BENEFICIARY SURVEY AND 8.0% IN THE CONTROL SURVEY. THE DIFFERENCE THAT A BURSARY, WHICH REPRESENTS SUCH A SMALL PROPORTION OF TOTAL INCOME, WOULD MAKE TO THESE INDIVIDUALS IS LIMITED. THIS SUPPORTS THE FINDINGS OF THE LITERATURE REVIEW THAT FINANCIAL ASSISTANCE SHOULD BE BASED ON NEED. THE MOST COMMON PROPORTION OF TOTAL INCOME DERIVED FROM THE BURSARY IN THE BENEFICIARY SURVEY WAS 100.0% AND 50.0% IN THE CONTROL SURVEY, INDICATING THAT THE BURSARIES REPRESENTED A SUBSTANTIAL VALUE FOR MOST APPLICANTS. BASES: 39 (BENEFICIARY SURVEY) AND 57 (CONTROL GROUP)

survey



Base: 47

Note: this was a multiple-choice question. 47 respondents submitted 102 responses in total

The response options for this question were set to appear in a random order to help avoid bias

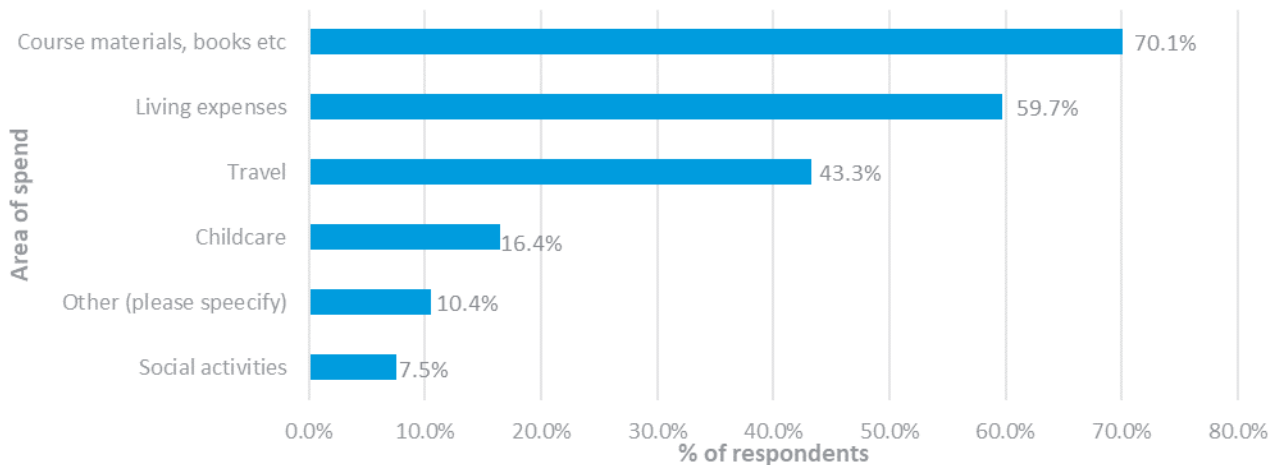
Almost a quarter of respondents to the beneficiary survey answered 'other' to this question (11 respondents). This included:

- nine respondents who stated that they were able to spend money on course fees due to the bursary
- one of the 9 also stated that it enabled them to spend money on a deposit⁶³
- one respondent stated that the bursary enabled them to spend money on a very good laptop for their course
- one respondent stated that *"it allowed me to lower the funding amount required by my employer making it a more attractive training option"*

While the latter is not ideal it should be noted that it is just one response.

⁶³ THE RESPONDENT DID NOT STATE WHAT THIS DEPOSIT WAS FOR.

Figure 4.5: What would the bursary have enabled you to spend money on – Control group



Base: 67

Note: this was a multiple-choice question. 67 respondents submitted 139 responses in total

The response options for this question were set to appear in a random order to help avoid bias

Seven respondents to the control group survey answered 'other' to this question (10.4% of respondents). This included:

- four respondents who stated that it would have enabled them to spend money on course fees/ paying for the course tuition
- two respondents stated that they could have kept their savings
- one respondent answered other but left the comments section blank

When responses were broken down by gender, female respondents to the beneficiary survey were slightly more likely to say receipt of the bursary enabled them to spend more money on childcare (15.0% of female respondents compared to 8.0% of male respondents). They were also more likely to say receipt of the bursary enabled them to spend more money on social activities than their male counterparts (30.0% of female respondents compared to 8.0% of male respondents), suggesting greater financial freedom (see Table 4.3 overleaf).

Table 4.3: What did the bursary enable you to spend money on by gender – Beneficiary survey

	Male	Female	Total
Living expenses	72.0%	70.0%	71.1%
Course materials, books etc	52.0%	50.0%	51.1%
Travel	44.0%	50.0%	46.7%
Childcare	8.0%	15.0%	11.1%
Social activities	8.0%	30.0%	17.8%
Other (please specify)	28.0%	20.0%	24.4%

Bases: 25 (male) and 20 (female)

Note: two of the 47 respondents skipped the question on gender

Responses about the relative value of the bursary to the individual were diverse. For most respondents it was a substantial sum. However, for some it represented a relatively small proportion of their total income and is unlikely to make a big difference to these individuals. This supports the findings of the literature review that financial assistance should be based on need.

4.4.2 Impact of the MSc programme

As noted earlier in this section, the majority of respondents to the beneficiary survey were still enrolled on their NCSC accredited MSc programme (78.7% of respondents). 19.1% of respondents to the beneficiary survey had completed their MSc programme. The remaining 2.1% (one respondent) did not complete the programme due to personal reasons. This individual did however, indicate that participation in the programme had the following impacts:

- improved my knowledge of how to identify, understand and express cyber security risks
- improved my knowledge of how to protect devices and systems
- improved my knowledge of how to detect cyber attacks
- improved my knowledge of how to respond to cyber attacks and mitigate their effects
- improved knowledge of how to recover from a cyber attack
- improved my knowledge of human, organisational and regulatory aspects of cyber security
- improved my employment prospects
- increased my earning potential

Table 4.4 shows the overall impacts reported by respondents to the beneficiary survey. This shows almost 90% of respondents indicated that the course improved their knowledge of how to protect devices and systems. 84.8% of respondents stated that the course improved their knowledge of how to identify, understand and express cyber security risks. The following answers were also selected by more than two thirds of respondents: improved my knowledge of how to recover from a cyber attack, increased my confidence, improved my knowledge of how to respond to cyber attacks and mitigate their effects, improved my knowledge of how to detect cyber attacks, and improved my knowledge of how to identify, understand and express cyber security risks.

Table 4.4: What has been the impact of this course? - Beneficiary survey

	%	Total
Improved my knowledge of how to protect devices and systems	89.1%	41
Improved my knowledge of how to identify, understand and express cyber security risks	84.8%	39
Improved my knowledge of human, organisational and regulatory aspects of cyber security	78.3%	36
Improved my knowledge of how to detect cyber attacks	76.1%	35
Improved my knowledge of how to respond to cyber attacks and mitigate their effects	76.1%	35
Increased my confidence	73.9%	34
Improved my knowledge of how to recover from a cyber attack	71.7%	33
Improved my employment prospects	63.0%	29
Set me on a career path in cyber security	58.7%	27
Increased my earning potential	54.3%	25
Raised my self-esteem	47.8%	22
Led to further study in cyber security	23.9%	11
Got a job in cyber security	21.7%	10
Achieved a Level 7 qualification (e.g. Master's Degree)	17.4%	8
Led to further study in another sector	6.5%	3
Got a job in another sector	4.3%	2
Other	4.3%	2

Base: 46

Two respondents answered 'Other':

- one stated that the course “*fuelled my interest in a PhD or research in the cyber security field*”
- the other stated that they were “planning on a job in cyber security – course has not finished yet.”

HESA data shows that the employment rate of postgraduate students is generally high (84.4% of UK and EU domiciled leavers in 2016/17 said their most important activity was working full-time or part-time). It also shows that the vast majority of these postgraduates are employed in professional occupations, based in the UK (90.8% and 90.3% respectively). (Source: HESA (2018) Introduction - Destinations of Leavers 2016/17: Tables B, F and G. Available at: <https://www.hesa.ac.uk/data-and-analysis/publications/destinations-2016-17/introduction> [Accessed 20/03/2019]). This supports the assumption that the achievement of an MSc will lead to a job.

Our consultations with HEI representatives indicated that completion rates and employment outcomes for the MSc programmes are generally good. Little destination data is collected to confirm this. Respondents to our beneficiary survey also reported a range of positive outcomes from the programme to date, even though the majority of respondents were still studying (78.7%).

The majority of respondents reported improved knowledge of:

- how to protect devices and systems (89.1%)
- how to identify, understand and express cyber security risks (84.8%)
- human organisational and regulatory aspects of cyber security (78.3%)
- how to detect cyber attacks (76.1%)
- how to respond to cyber attacks and mitigate their effects (76.1%)
- how to recover from a cyber attack (71.7%)

Ten respondents also got a job in cyber security as a result of their participation in the MSc programme (despite not all having completed it yet). Three quarters of respondents agreed or strongly agreed that completing the course has helped (or will help) them to get a cyber security job. We recommend that DCMS conducts a long term follow up with beneficiaries in 3 to 5 years, to find out what the impact of the Scheme has been. A minority of respondents (13.0%) disagreed or strongly disagreed that the programme has helped (or will help) them to get a cyber security job, the open-ended responses given suggest that this could be addressed by more explicitly linking the knowledge acquired to its technical application.

4.5 Additionality

Additionality is the extent to which something happened as the result of an intervention that would not have happened without the intervention.⁶⁴ The HEI representatives we consulted believed that some beneficiaries would not have been able to do a postgraduate degree without the bursary:

⁶⁴ ENGLISH PARTNERSHIPS (2008) ADDITIONALITY GUIDE. AVAILABLE AT: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191511/Additionality_Guide_0.pdf [ACCESSSED 28/03/19]

- “Yes it [the Bursaries Scheme] has been an enabler.” (HEI representative)
- “Some definitely couldn’t have afforded to do the MSc without the bursary. Most applicants asked for support.” (HEI representative)
- “Three or 4 [out of 10 applicants] wouldn’t have been able to do the course without the bursary. The others would have found a way because they were determined to do it.” (HEI representative)
- “For some beneficiaries the bursary was the difference between being able to do the course or not.” (HEI representative)
- “The bursary is most useful in attracting people who wouldn’t have otherwise thought of applying. It makes a huge difference to those who get it.” (HEI representative)
- one HEI had between 3 and 5 students withdraw their applications when they were told they were not eligible for the bursary

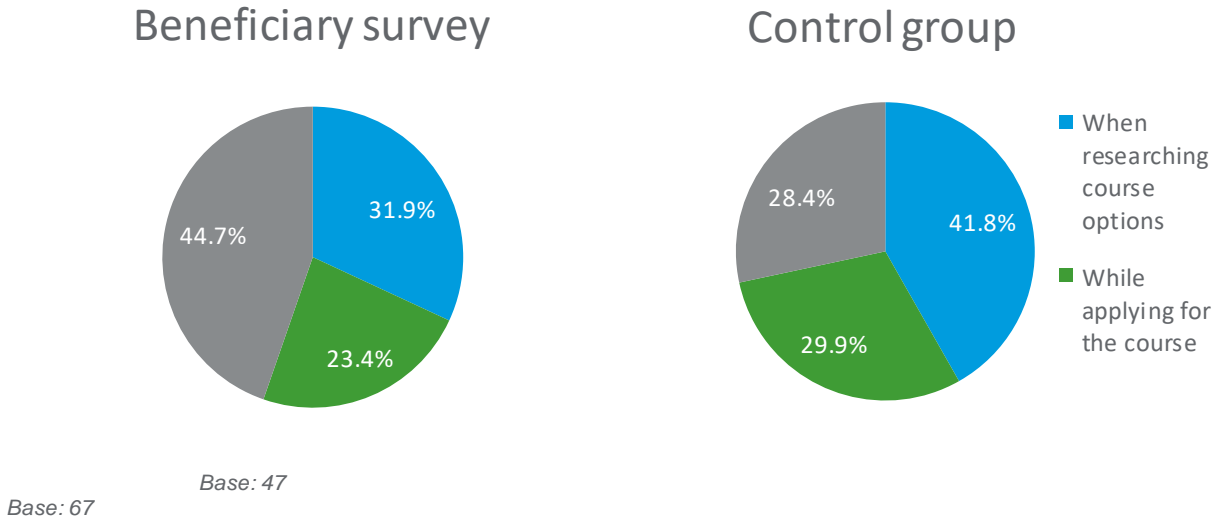
Some consultees based this on their knowledge of the individual beneficiaries and their situations and others explicitly asked this at application stage. The latter is not the best way to determine need as applicants to a bursary scheme are unlikely to say they would do the MSc regardless of the bursary. DCMS should, therefore, consider the appropriateness of including an assessment of financial need at application stage.⁶⁵

The HEI representatives consulted commented that drop-out rates on MSc programmes in general were low (typically less than 10%) and, therefore, they were unable to say that whether the Scheme has had any impact on drop-out rates. A number of HEIs did, however, comment that beneficiaries were generally less likely to drop-out because: “The Scheme typically attracts hard working students, who attain higher than average scores.” (HEI representative).

We asked survey respondents when they found out about the Bursaries Scheme. As Figure 4.7 shows, while the majority of respondents to the beneficiary and control surveys found out about the Scheme before they were accepted onto the course, a substantial proportion of both survey respondents did not find out about the Bursaries Scheme until after they were accepted onto the course (44.7% and 28.4% of respondents respectively). **Therefore, the bursary could not have influenced these individuals to apply for the MSc programme.** Conversely people who most needed financial assistance may not have applied for the MSc programme because they were unaware any was available. This supports the previous argument for more, better targeted and consistent promotion of the Scheme.

⁶⁵ THIS RECOMMENDATION WAS ACTIONED BY DCMS IN YEAR 3 OF THE BURSARIES SCHEME (AFTER THE 2 YEAR PILOT)

Figure 4.6: When did you find out about the Bursaries Scheme?





DEVELOPED THE ACADEMIC KNOWLEDGE NEEDED

Beneficiary case study

Jenny is a 27 year old white female from London. She has a BSc in a non-technical field and was working in business resilience.

In the final year of my undergraduate degree I applied for a lot of jobs and decided on consulting because it seemed like a good way of getting a wider range of experiences with different clients. I had always been interested in the information security/ cyber elements of resilience but didn't have the knowledge or experience to get involved in that type of work. I felt the need to understand the theory and I thought the master's degree would be a good way of doing that.

I couldn't have done the MSc without the bursary. I had financial commitments, like my mortgage. I aim to complete my MSc in the next year or two, but I've already been promoted and selected for more technical work as a result of the knowledge I've developed on my MSc to date.

In the long term, I'm hoping to continue progressing my career in cyber security and bring more diversity to the profession.

I couldn't have done it without the bursary

To understand the counterfactual scenario, we asked respondents to the beneficiary survey what they would have done if their bursary application had been declined (see Table 4.5). The most popular answers were:

- secured alternative finances to fund the same course (19.1% of respondents)
- financed the same course myself (14.9% of respondents)

Table 4.5: What would you have done if your bursary application was declined? – Beneficiary survey

	%	Total
Secured alternative finances to fund the same course	19.1%	9
Financed the same course myself	14.9%	7
I don't know	12.8%	6
I would have ended up not in education, training or employment	10.6%	5
Got a job/ continued working in another sector	8.5%	4
Completed the same course over a longer period and got a job/ continued to work to help fund my studies	8.5%	4
Chose another cyber security course where financing was available	8.5%	4
Other (please specify):	6.4%	3
Chose a course in a different sector where financing was available	2.1%	1
Got a job in cyber security without any further studies	2.1%	1
Continued working in the cyber security sector	6.4%	3

Base: 47

Note: Three participants answered 'other' to this question: "I would have gone to another university without £2,000 deposit"; "not sure, may have considered another course, or part-time working to make up funds"; and "try to convince my employer to let me swap job roles (non-cyber security)".

When we compare this to the control group's responses to a similar question, what did you do when your bursary application was declined (see Table 4.6 overleaf), we can see that:

- 19.4% of respondents secured alternative finances to fund the same course
- 29.9% financed the same course themselves
- 23.9% got a job/ continued working in another sector

This shows that almost half of the control group found some other way to take part in an NCSC accredited MSc programme.

Table 4.6: What did you do when your application was declined? – Control group

	%	Total
Financed the same course myself	29.9%	20
Got a job/ continued working in another sector	23.9%	16
Secured alternative finances to fund the same course	19.4%	13
Completed the same course over a longer period and got a job/ continued to work to help fund my studies	7.5%	5
Continued working in the cyber security sector	6.0%	4
Chose another cyber security course where financing was available	6.0%	4
I am currently not in education, training or employment	4.5%	3
Chose a course in a different sector where finance was available	1.5%	1
Got a job in cyber security without any further studies	1.5%	1

Base: 67

42 of the 43 respondents in the control group who went on to do a NCSC accredited Master’s programme, another cyber security course or a course in a different sector, told us the outcomes of those courses:

- 35 respondents (83.3%) are still completing that course, including the respondent who chose a course in a different sector
- four respondents achieved a Master’s degree via an NCSC accredited programme (9.5%)
- one respondent achieved a level 7 qualification on another cyber security course where financing was available (2.4%)
- one respondent who secured alternative finances to fund the same course didn’t complete the course due to financial reasons (2.4%)
- one respondent who financed the same course themselves didn’t complete the course for other reasons (2.4%)

11 of the respondents who went on to further study when their bursary application was declined are currently employed in a cyber security role.

The bases being used are low and therefore caution needs to be used with the following extrapolation.

If we assume each of the alternative options represents full (100%), partial (50%) or zero (0%) deadweight or displacement or substitution⁶⁶ of another activity then we can use the results of the beneficiary and control group surveys to estimate the proportion of respondents who are likely to have been engaged in cyber security without the Bursaries Scheme, either through the Master's programme, another cyber course or via their job (see Table 4.7 overleaf). We have assumed that there is no leakage⁶⁷ from this intervention as there is no evidence of beneficiaries leaving the UK. This results in an estimated combined deadweight, substitution and displacement effect of 50% to 65% and an estimated additionality range of 35% to 50%. This suggests that between 60 and 80 of the 118 beneficiaries are likely to have undertaken the MSc programme or engaged in cyber security in some other form without the Bursaries Scheme. Conversely it indicates that the Bursaries Scheme encouraged between 40 and 60 beneficiaries to undertake postgraduate degree in cyber security. **Note these figures are indicative because the bases for both surveys are relatively low.**



FROM CATERING TO CYBER SECURITY

Beneficiary case study

John is a 33 year old white male from Northern Ireland. He has a Business Information Technology degree, but had been working in his family's catering business since he graduated in 2008. It gave me peace of mind

I wanted to get back into IT but things had moved on so much. I wanted to reskill and cyber security seemed interesting. It's something I played about with as a teenager. I saw the MSc programme. I thought it was expensive but I applied to study on a full time basis anyway. I was used to earning a living so I had some savings that I would have used to pay my fees. Then I found out about the bursary. Getting the bursary gave me peace of mind that I wouldn't have to dip into my savings.

Since September 2018 I've been working as a Cyber Consultant for a 'big four' professional service firm. The postgrad. wasn't a requirement, they employ recent graduates too, but I wouldn't have got the job without it. I was out of the industry for too long. My plans for the future are to build my career in cyber security and work my way up the ladder.

⁶⁶ DEADWEIGHT REFERS TO WHAT WOULD HAPPEN WITHOUT THE INTERVENTION; DISPLACEMENT IS THE PROPORTION OF INTERVENTION OUTPUTS THAT HAVE LED TO REDUCED OUTPUTS ELSEWHERE IN THE TARGET AREA (E.G. A TARGET BENEFICIARY CHOOSING A NCSC ACCREDITED MSC PROGRAMME OVER ANOTHER CYBER SECURITY POSTGRADUATE DEGREE DUE TO THE AVAILABILITY OF A BURSARY); AND SUBSTITUTION ARISES WHERE ONE ACTIVITY IS SUBSTITUTED FOR A SIMILAR ONE TO TAKE ADVANTAGE OF PUBLIC SECTOR ASSISTANCE (E.G. A BENEFICIARY CHOOSING A MSC IN CYBER SECURITY RATHER THAN A POSTGRADUATE IN COMPUTER SCIENCE TO AVAIL OF THE BURSARY FUNDING) (SOURCE: ENGLISH PARTNERSHIPS (2008) ADDITIONALITY GUIDE)

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191511/Additionality_Guide_0.pdf [ACCESSED 08/05/19]

⁶⁷ LEAKAGE IS THE PROPORTION OF THE OUTPUTS THAT BENEFIT THOSE OUTSIDE OF THE TARGET AREA OR GROUP (E.G. POSTGRADUATES LEAVING THE UK) (SOURCE: ENGLISH PARTNERSHIPS (2008) ADDITIONALITY GUIDE.)

[HTTPS://ASSETS.PUBLISHING.SERVICE.GOV.UK/GOVERNMENT/UPLOADS/SYSTEM/UPLOADS/ATTACHMENT_DATA/FILE/191511/ADDITIONALITY_GUIDE_0.PDF](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191511/Additionality_Guide_0.pdf)

Table 4.7: Estimated additionality

	Deadweight/ substitution/ displacement (%)	Beneficiaries	Control Group
Secured alternative finances to fund the same course	100.0%	9	13
Financed the same course myself	100.0%	7	20
Completed the same course over a longer period and got a job/ continued to work to help fund my studies	50.0%	2	2.5
Chose another cyber security course where financing was available	50.0%	2	2
Chose a course in a different sector where financing was available	0.0%	0	0
Got a job in cyber security without any further studies	100.0%	1	1
Continued working in the cyber security sector	100.0%	3	4
Got a job/ continued working in another sector	0.0%	0	0
I am currently not in education, training or employment	0.0%	0	0
I don't know	0.0%	0	-
Other (please specify):	0.0%	0	-
Total deadweight/ substitution/ displacement (n)		24	42.5
Base		47	67
Total deadweight/ substitution and displacement (%)		51.1%	63.4%
Estimated additionality		48.9%	36.6%

Note: Leakage is assumed to be 0% as there is no evidence of beneficiaries leaving the UK.

4.6 Summary

The Bursaries Scheme aims to increase the volume and diversity of cyber security professionals in the UK by encouraging more candidates into a NCSC accredited MSc programme. It specifically targets women. 118 bursaries have been awarded to beneficiaries through the pilot scheme. 110 are progressing well. Almost a quarter of beneficiaries are female (23.7%) which is in line with HEI estimates about the proportion of eligible students who are female (20-25%).

There is evidence of beneficiaries transitioning into the sector through the MSc programme (based on HEI consultations, student surveys and case study consultations). 66.6% of the 9 beneficiaries who had completed their MSc got a cyber security job or went on to further study in the sector (note low base).

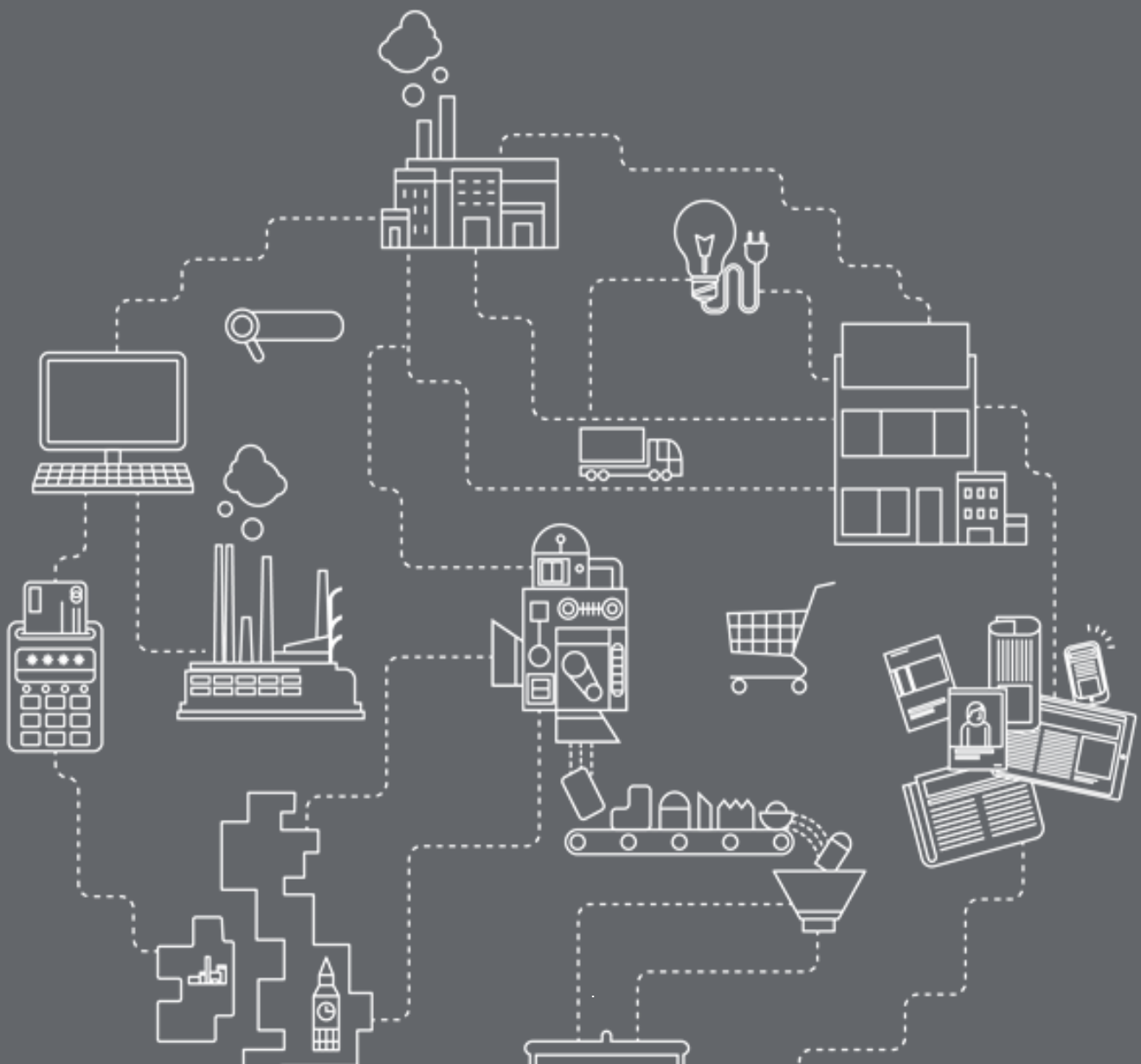
Beneficiaries were positive about the impact that the MSc course would have on their cyber security career. Almost three quarters of respondents agreed or strongly agreed that completing the course has helped (or will help) them to get a cyber security job. We recommend that DCMS conducts a long term follow up with beneficiaries in 3 to 5 years, to find out what the impact of the Scheme has been (see Section 4). A minority of respondents (13.0%) disagreed or strongly disagreed that the programme has helped (or will help) them to get a cyber security job, the open-ended responses given suggest that this could be addressed by more explicitly linking the knowledge to its technical application.

One sector representative also felt that **the outputs of the MSc programme could be more explicitly linked to national research priorities by providing additional support for beneficiaries who choose a dissertation topic that is aligned to the National Cyber Security Strategy. Beneficiaries could potentially be paired with a sponsor or mentor from DCMS or the NCSC who could participate in their Master's supervisory meetings to make sure the research is aligned to government research interests (Recommendation 8)**. The practicality of the latter part of this recommendation will depend on the total number of beneficiaries on the Scheme at any one time.

There is also evidence, from the consultations and surveys, that the Scheme has increased awareness of cyber security as a profession and the MSc programme as a pathway into it (availability of funding attracted 31.9% of beneficiary respondents and 22.4% of the control group to apply for the MSc programme). However, the ability to attract people in this way will be restricted by the limited promotion of the Scheme to date. A substantial proportion of successful and unsuccessful applicants didn't find out about the Bursaries Scheme until after they were accepted onto the MSc programme (44.7% of respondents to the beneficiary survey and 28.4% of the control group). This suggests that the additionality of the Scheme could be improved by better advertising to target those most in need (see Section 4).

There is evidence that at least some of the beneficiaries would not have been able to undertake these studies or secure a cyber security role without the Bursaries Scheme. Based on the survey evidence it is estimated that the Bursaries Scheme encouraged 35% to 50% of respondents to undertake a postgraduate degree in cyber security. **Note as the bases for both surveys are relatively low, these figures are indicative only.**

On balance, given the high demand for cyber security professionals across the UK and the current lack of diversity within the sector, the Scheme does represent value for money and should continue while the current high-level skills gap persists.



5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

The purpose of this section is to present the conclusions and recommendations of this evaluation of the cyber security postgraduate Bursaries Scheme.

5.2 Conclusions

This subsection presents the key findings of the evaluation. In some cases, these go beyond the specific research questions set out in the ITT. Conclusions against the research questions are summarised in Table 5.1.

The cyber security postgraduate Bursaries Scheme is clearly aligned to a number of government strategies which aim to develop the UK cyber security sector.⁶⁸ A review of the literature also demonstrates clear evidence of a need for high-level skills in the cyber security sector.⁶⁹ However, employers are likely to need support to determine whether or not the skills acquired by beneficiaries via a NCSC accredited MSc programme fit their requirements. This may act as a barrier to beneficiaries gaining employment (see Recommendation 1. overleaf).

Research shows that while financial support is not the main factor in a students' decision to participate in higher education⁷⁰ it is a contributing factor to student recruitment and retention, particularly for students from low income and other underrepresented backgrounds⁷¹. As the Bursaries Scheme seeks to increase diversity within the sector as well as addressing the current skills gap, it is clearly filling a gap and addressing market failure in the sector. However, the literature also states that, for such interventions to be successful in widening participation, they need to be targeted according to need⁷² (see Recommendation 2. overleaf).

Aligning the Scheme to NCSC accredited MSc programmes shows a joined-up approach and sends a clear message to industry about the standard of these programmes. There is a good geographical spread of opportunities, which DCMS should seek to maintain as more programmes become accredited (see Recommendation 3. overleaf).

The timing of the DCMS confirmation of the allocated sum and postgraduate recruitment timeframes has resulted in limited promotion of the Scheme to date. This has restricted the Schemes' ability to attract people, particularly from underrepresented groups; 44.7% of respondents to the beneficiary survey and 28.4% of respondents to the control group survey did not find out about the Scheme until after they were accepted onto the MSc programme (see Recommendation 4. overleaf).

⁶⁸ INCLUDING: NATIONAL CYBER SECURITY STRATEGY 2016–2021; INITIAL NATIONAL CYBER SECURITY SKILLS STRATEGY; AND DIGITAL SKILLS STRATEGY (2017).

⁶⁹ IPSOS MORI (2018) UNDERSTANDING THE UK CYBER SECURITY SKILLS LABOUR MARKET https://www.ipsos.com/sites/default/files/ct/publication/documents/2019-01/understanding_the_uk_cyber_security_skills_labour_market.pdf [ACCESSED 08/05/19]

⁷⁰ FAGENCE, S. AND HANSON, J. (YOUTH SIGHT) (2018) INFLUENCE OF FINANCE ON HIGHER EDUCATION DECISION-MAKING, LONDON: DEPARTMENT FOR EDUCATION.

⁷¹ WAKELING, P. (2015) PROGRAMME ANALYSIS OF HEFCE'S POSTGRADUATE SUPPORT SCHEME. FINAL REPORT TO ESRC AND HEFCE. SEPTEMBER 2015.

https://webarchive.nationalarchives.gov.uk/20160106165136/http://www.hefce.ac.uk/pubs/rereports/Year/2015/pssfinal/Title_105303.en.html [ACCESSED 08/05/19]

⁷² WAKELING, P. (2015) PROGRAMME ANALYSIS OF HEFCE'S POSTGRADUATE SUPPORT SCHEME. FINAL REPORT TO ESRC AND HEFCE. SEPTEMBER 2015.

https://webarchive.nationalarchives.gov.uk/20160106165136/http://www.hefce.ac.uk/pubs/rereports/Year/2015/pssfinal/Title_105303.en.html [ACCESSED 08/05/19]

DCMS has tried to be as flexible as possible in its delivery of the pilot, however, this has led to a lack of consistency in how universities select bursary recipients and a lack of consistent management information (see Recommendation 5. and Recommendation 6. overleaf).

There has been sufficient demand to distribute almost all of the funding allocated to the pilot scheme (97.4%). The vast majority of beneficiaries are progressing well (93.2%) and proportion of female beneficiaries is relatively high (23.7%) in comparison to other cyber security schemes (10.9% of trainees from the HMG Cyber Retraining Academy pilot were female⁷³) and the IT industry in general (17% female)⁷⁴. There is evidence that the Scheme has attracted a minority of beneficiaries to the MSc programmes (22.4% of respondents to the control group survey and 31.9% of respondents to the beneficiary survey were attracted by the availability of funding) and that the bursary was of substantial value to beneficiaries. In view of these outcomes from the 2 year pilot, DCMS has made policy changes in Year 3 of the Scheme that increased the percentage of female beneficiaries to 38.5%.⁷⁵

While beneficiary destination data is limited (see Recommendation 7. overleaf), this evaluation identified a range of positive outcomes for beneficiaries including increased knowledge, employment in cyber security and, to a lesser extent, progression to further studies in cyber security. The outputs of the MSc programme for beneficiaries could help contribute to national research priorities by encouraging bursary beneficiaries to choose a dissertation topic that is aligned to the National Cyber Security Strategy. This could potentially include a DCMS or NCSC sponsor or mentor to ensure the beneficiaries' research is aligned to government research interests (see Recommendation 8. overleaf).

There is evidence of additionality. Based on the survey findings we estimate that between 35% and 50% of respondents could not have taken part in the MSc programme without the bursary.

⁷³ EY (2017) HMG CYBER RETRAINING ACADEMY PILOT: EVALUATION REPORT

⁷⁴ BRITISH COMPUTER SOCIETY (BCS) (2017) DIVERSITY IN IT 2017: SHAPING OUR FUTURE TOGETHER. AVAILABLE AT: <https://www.bcs.org/upload/pdf/diversity-report-2017.pdf> [ACCESSED 28/03/19]

⁷⁵ THIS FIGURE IS BASED ON THE NUMBER OF BURSARIES REPORTED IN YEAR 3 TO DATE AND IS SUBJECT TO REVIEW

Table 5.1: Research questions

Research questions	Conclusions
Is the Bursaries Scheme an effective form of government intervention that succeeds in its aim of getting candidates into cyber security ⁷⁶ through NCSC accredited MSc programmes?	There is evidence that the Bursaries Scheme has encouraged some beneficiaries to take part in a NCSC accredited cyber security MSc programme ⁷⁷ and that this has led to a range of outcomes including employment in cyber security and progression to further studies in a related field ⁷⁸ . There has been no noticeable impact on completion rates of the MSc programmes, which in general are high.
What impact has this Scheme had in getting candidates into cyber security roles ⁷⁹ and would they have otherwise been able to undertake these studies?	There is evidence that a substantial proportion of beneficiaries could not have undertaken the MSc programme without a bursary. ⁸⁰ While there is limited destination data for bursary beneficiaries, anecdotal evidence suggests that beneficiaries are progressing into employment in cyber security. While these roles do not necessarily require a MSc level qualification, beneficiaries are unlikely to have met the job requirements without it, given the requirement for beneficiaries not to have previously worked in a cyber security role.

⁷⁶ THIS EVALUATION HAS CONSIDERED: UPTAKE AND COMPLETION OF THE MSc PROGRAMME BY BENEFICIARIES; PROGRESSION TO FURTHER STUDIES IN A RELATED FIELD; AND EMPLOYMENT IN CYBER SECURITY.

⁷⁷ BASED ON OUR SURVEY EVIDENCE WE ESTIMATE THAT THE BURSARIES SCHEME ATTRACTED BETWEEN 22.4% AND 31.9% OF RESPONDENTS TO TAKE UP THE MSc PROGRAMME.

⁷⁸ SIX OF THE 9 BENEFICIARIES WHO HAD COMPLETED THEIR MSc GOT A CYBER SECURITY JOB OR WENT ON TO FURTHER STUDY IN THE SECTOR (NOTE LOW BASE).

⁷⁹ INCLUDING WHETHER THE CYBER SECURITY ROLE THEY GOT REQUIRED A MSc LEVEL QUALIFICATION.

⁸⁰ BASED ON OUR SURVEY EVIDENCE WE ESTIMATE THAT BETWEEN 35% AND 50% OF RESPONDENTS COULD NOT HAVE TAKEN PART IN THE MSc PROGRAMME WITHOUT THE BURSARY.

5.3 Recommendations

On balance, given the high demand for cyber security professionals across the UK⁸¹ and the current lack of diversity within the sector⁸², we recommend that the Scheme continues while the current high-level skills gap persists. The remainder of this section lists 8 recommendations, based on the conclusions set out above, which aim to improve the impact of the Scheme.

1. Government should support industry to recruit suitable cyber security professionals by providing clearer pathways for cyber security professionals and mapping the MSc course material to specific high-level skills and tasks.
2. DCMS should set out guidelines for HEIs to assess students' financial circumstances as part of the bursaries application and selection process to make sure the funds are awarded to those who need them most.⁸³
3. As more MSc programmes become NCSC accredited, DCMS should consider regional or place based allocations to make sure bursary opportunities are distributed equitably across the UK.
4. DCMS should consider alternative means of promoting and signposting the Scheme (e.g. via the National Union of Students, the NCSC, Women's Security Society and other industry representatives).
5. DCMS should set out a clear policy for how it expects universities to apply the selection criteria, and the extent to which university inclusion teams should be involved in this process, to make sure bursaries are reaching the target beneficiaries.
6. DCMS should set clear objectives about the data it expects universities to collect and keep.
7. DCMS should consider establishing a beneficiary community to enable engagement and long term follow up research with beneficiaries and create a virtual community of UK cyber security professionals that have accessed the profession from currently underrepresented groups. A beneficiary community would also have the added benefit of creating a national peer support group and facilitating networking and mentoring opportunities for future and current beneficiaries. This community could be created by using social media such as LinkedIn or WhatsApp.
8. DCMS should consider linking the outputs of beneficiaries' degrees to national research priorities by supporting bursary beneficiaries who choose a dissertation topic aligned to the National Cyber Security Strategy. This could potentially involve a NCSC or DCMS sponsor to ensure their research is aligned to national cyber security research interests.

⁸¹ IPSOS MORI (2018) UNDERSTANDING THE UK CYBER SECURITY SKILLS LABOUR MARKET
https://www.ipsos.com/sites/default/files/ct/publication/documents/2019-01/understanding_the_uk_cyber_security_skills_labour_market.pdf [ACCESSED 08/05/19]

⁸² BRITISH COMPUTER SOCIETY (BCS) (2017) DIVERSITY IN IT 2017: SHAPING OUR FUTURE TOGETHER. AVAILABLE AT:
<https://www.bcs.org/upload/pdf/diversity-report-2017.pdf> [ACCESSED 28/03/19]

⁸³ THIS RECOMMENDATION WAS ACTIONED BY DCMS IN YEAR 3 OF THE BURSARIES SCHEME (AFTER THE 2 YEAR PILOT)

APPENDIX A: PROFILE OF SURVEY RESPONDENTS

APPENDIX A: PROFILE OF SURVEY RESPONDENTS

6.1 Overview

We developed 2 online surveys to capture the opinions of people who applied to the cyber security postgraduate Bursaries Scheme. Because the HEIs did not have consent to share applicant contact details with DCMS or the evaluation team, both surveys were distributed, via the HEIs, to:

- Beneficiaries - students that received a bursary through the Scheme (achieving 47 responses)⁸⁴
- A control group - people who applied for a bursary but were unsuccessful (achieving 67 responses)⁸⁵

It should be noted that response to the control group survey was incentivised with a £50 retail voucher (for the first 100 respondents).

This approach is likely to have skewed the profile of respondents resulting in the majority of respondents to both surveys being currently enrolled on a MSc programme (78.7% of respondents to the beneficiary survey and 56.7% of respondents in the control group).

The remainder of this appendix is structured under the following sub headings:

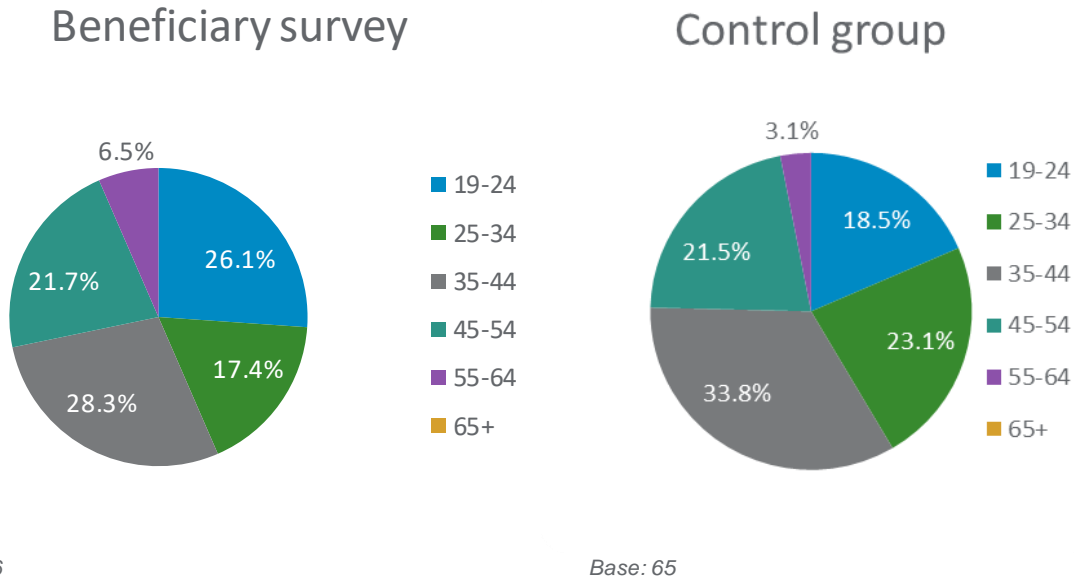
- demographic profile
- background and education

⁸⁴ THE TOTAL POPULATION FOR THIS GROUP WAS 118. THE 47 RESPONSES RECEIVED RESULTS IN A 40% RESPONSE RATE, WHICH IS RELATIVELY HIGH FOR AN EXTERNAL ONLINE SURVEY ADMINISTERED VIA A THIRD PARTY. HOWEVER, DUE TO THE RELATIVELY LOW POPULATION, MEANING THE TOTAL NUMBER OF STUDENTS WHO RECEIVED A BURSARY THE MARGIN OF ERROR FOR THIS SURVEY IS RELATIVELY HIGH (+/- 11% AT THE 95% CONFIDENCE LEVEL). THIS MEANS THAT OUR SURVEY FINDINGS ARE INDICATIVE AND SHOULD NOT BE GENERALISED TO REPRESENT THE WHOLE POPULATION.

⁸⁵ DUE TO INCOMPLETE DATA PROVIDED BY SOME OF THE UNIVERSITIES INVOLVED IN THE BURSARIES SCHEME, THE TOTAL POPULATION FOR THIS GROUP IS UNKNOWN. WE ARE, THEREFORE, UNABLE TO CALCULATE THE MARGIN OF ERROR. FOR THIS REASON, THESE SURVEY FINDINGS ARE ALSO BEING TREATED AS INDICATIVE.

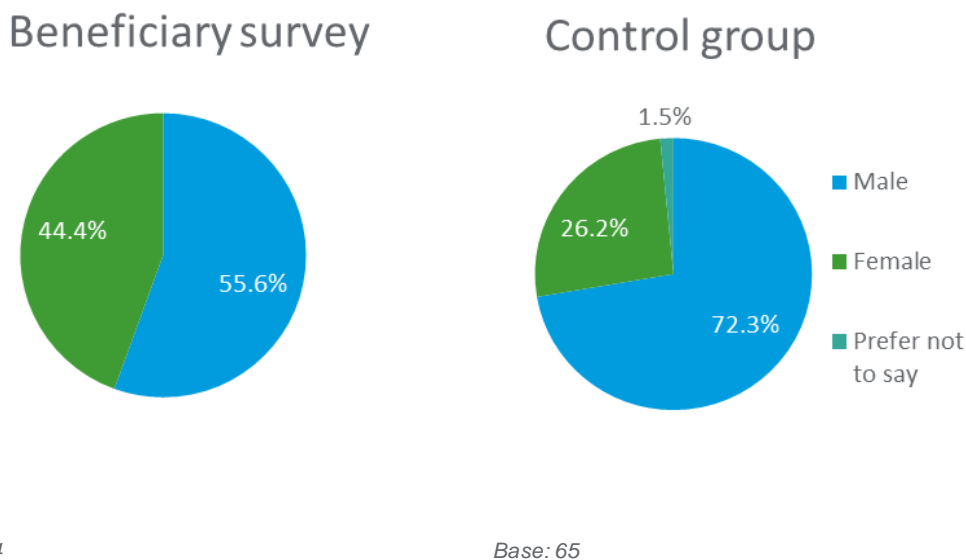
6.2 Demographic profile

Figure 6.1: Age of Respondents



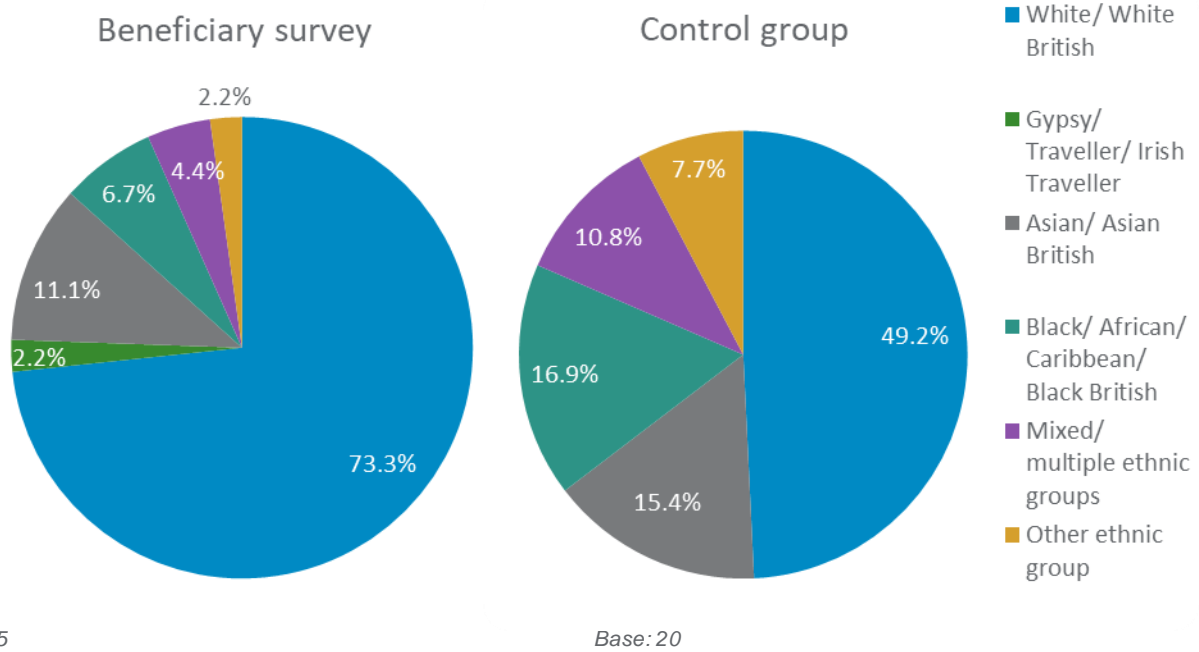
As shown in Figure 6.1, 26.1% of respondents from the beneficiary survey were aged 19-24. A further 45.7% were aged 25-44 and 21.7% were aged 45-54, while only 6.5% were aged 55-64. The age breakdown of the beneficiary group was similar to the control group, where 18.5% of participants were aged 19-24, 56.9% of respondents were aged 25-44, 21.5% were aged 45-54, 3.1% were aged 55-64.

Figure 6.2: Gender of Respondents



As shown in Figure 6.2, a slight majority of respondents from the beneficiary survey were male (55.6%) whilst just 44.4% were female. However, the majority of men is significantly higher in the control group as they account for 72.3% of responses, whereas females account for just 26.2% of responses and 5% of responses preferred not to say whether they were male or female.

Figure 6.3: Ethnicity of Respondents

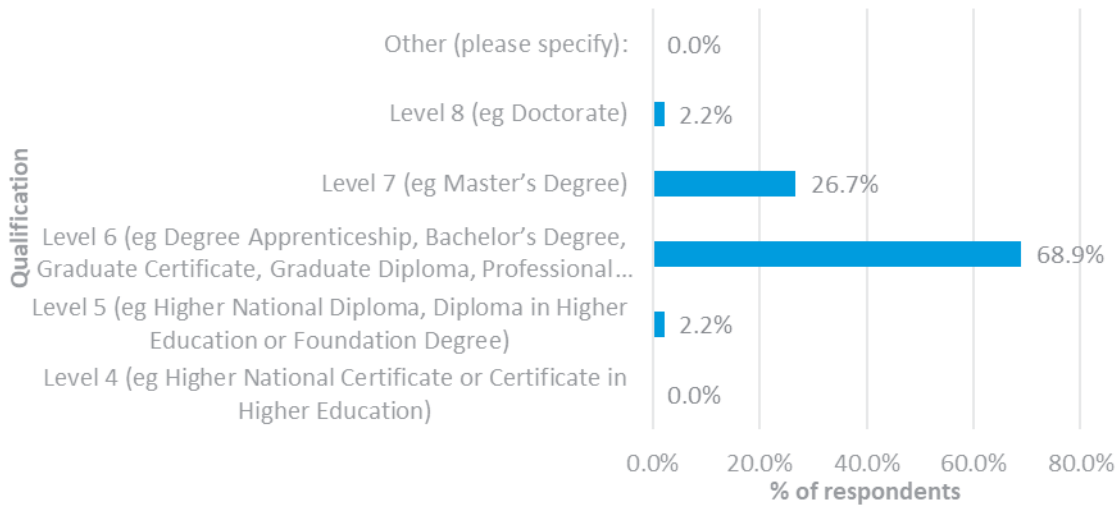


As shown in Figure 6.3, almost three quarters (73.3%) of respondents from the beneficiary survey were White/ White British. This ethnicity composition is greater than that of the control group by 24.1% (49.2%), however, in both cases, the majority of respondents are White/ White British. Just 6.7% of beneficiary respondents were Black/ African/ Caribbean/ Black British compared to 16.9% within the control group.

6.3 Background and education

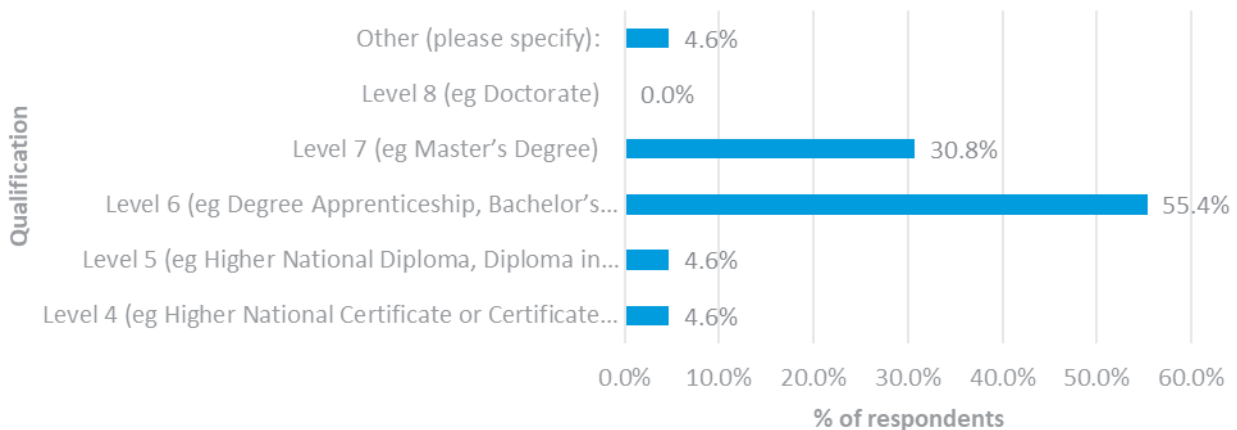
Figures 6.4 and 6.5 depict the highest level of qualification that the beneficiary and control group respondents had achieved prior to applying for the Bursaries Scheme.

Figure 6.4: Highest Level of qualification prior to applying – Beneficiary survey



Base: 41

Figure 6.5: Level of Qualification – Control group



Other: ACA, Teaching qualification, MA (Cantab); A Levels; and none

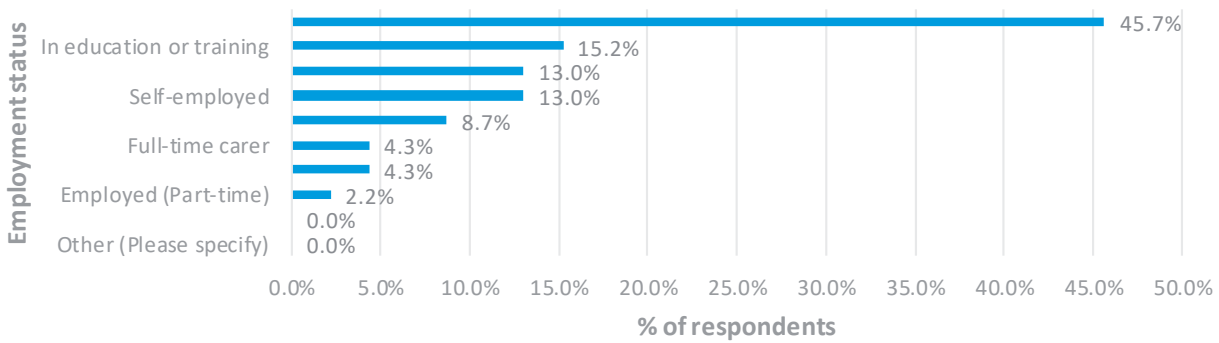
Base: 65

As shown in Figure 6.4, the highest level of qualification prior to applying for the majority of respondents from the beneficiary survey was level 6 (68.9%), followed by level 7 (26.7%). These results are similar to those shown in Figure 6.5 from the control group, however, there is a slightly higher proportion of respondents with their highest qualification being level 7 (30.8%) and a 13.5% lower proportion of respondents whose highest level of qualification was level 6 (55.4%).

95.6% of respondents that completed the beneficiary survey had a ‘highest qualification’ of either level 6 or level 7 prior to applying, as opposed to 86.2% from the control survey. Furthermore, Figure 6.5 indicates that 9.2% of the control survey responses had just a level 4 or level 5 qualification prior to applying. All of the respondents (beneficiary and control group) had achieved at least a Level 4 qualification.

Figures 6.6 and 6.7 show the employment status of respondents prior to applying for a bursary.

Figure 6.6: Employment status prior to applying - Beneficiary survey

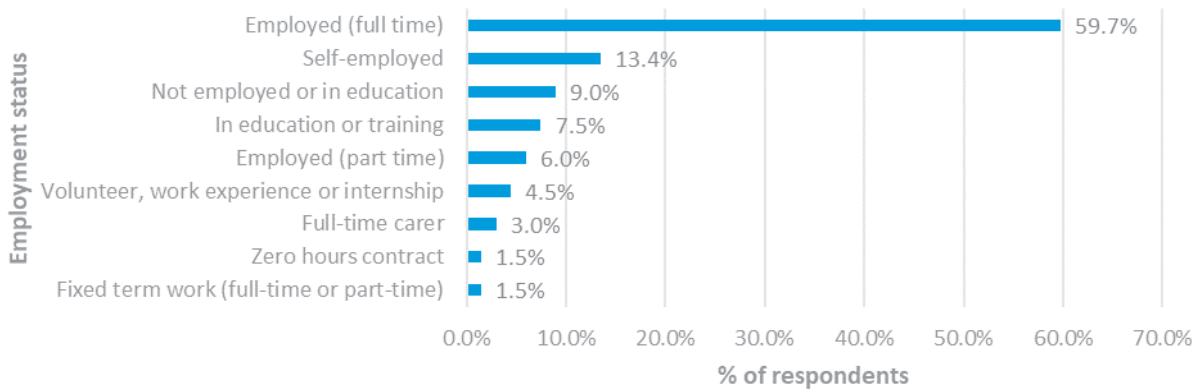


Base: 46

Note: this was a multiple-choice question. percentages do not sum to 100% due to some respondents selecting more than one answer

This was a multiple-choice question: 46 respondents⁸⁶ submitted 49 responses in total. Two respondents selected multiple options including: zero hours contract and volunteer/ work experience/ internship and employed (part-time) and in education or training.

⁸⁶ 2 RESPONDENTS ANSWERED BOTH: IN EDUCATION OR TRAINING AND NOT EMPLOYED OR IN EDUCATION OR TRAINING. THESE ARE CONTRADICTIONARY RESPONSES AND HAVE BEEN REMOVED AS INVALID. ONE OF THESE RESPONDENTS WAS REMOVED ENTIRELY, HOWEVER, THE OTHER ALSO SELECTED “VOLUNTEER, WORK EXPERIENCE OR INTERNSHIP” AND WAS KEPT IN.

Figure 6.7: Employment status prior to applying – Control group

Base: 67

Note: this was a multiple-choice question. percentages do not sum to 100% due to some respondents selecting more than one answer

Three respondents selected more than one option for their employment prior to applying including:

- employed (full-time) and fixed term work (full-time or part-time)
- self-employed, full-time carer and volunteer, work experience or internship
- volunteer, work experience or internship and not employed or in education

Two respondents selected 'other' as their employment status prior to applying, but these have been recoded as follows:

- full-time mother > full-time carer
- armed forces > full-time employed

As shown in Figures 6.6 and 6.7, the majority of survey respondents in both the beneficiary and control surveys were employed (full-time) prior to applying for the Bursaries Scheme (44.7% and 59.7% respectively). 14.9% of respondents who completed the beneficiary survey were in education or training prior to applying for the bursary, which is almost double the proportion of respondents who were in education or training prior to applying that completed the control survey (7.5%). 8.5% of respondents who completed the beneficiary survey had a zero hours contract prior to applying for the Bursaries Scheme, on the other hand, just 1.5% of those who completed the control survey had a zero hours contract prior to applying for the Bursaries Scheme.

Table 6.1 overleaf shows whether the bursary applicants had applied to study their Master's degree on a full-time or part-time basis.

Table 6.1: Full-time or part-time study

	Beneficiary survey		Control group survey	
	%	Total	%	Total
Full-time	53.3%	24	43.1%	28
Part-time	46.7%	21	56.9%	37
Total	100.0%	45	100.00%	65

Bases: 45 (Beneficiary survey) and 65 (control group survey)

The majority of respondents that completed the beneficiary survey applied to study full-time (53.3%) compared to part-time (46.7%), on the other hand, the majority of respondents that completed the control group survey applied to study part-time (56.9%) compared to full-time (43.1%).

APPENDIX B: ADDITIONAL CASE STUDIES

APPENDIX B: ADDITIONAL CASE STUDIES

Note: the case studies developed as part of this evaluation are based on actual beneficiaries, but their names have been changed to protect their anonymity



EMBARKING ON AN IMPORTANT CAREER PATH BACKED BY GOVERNMENT

Beneficiary case study

Mark is a 37 year old, white male living in the North West of England. He graduated with a first-class MEng degree in Electronic Engineering in 2005.

Kicking off a new career in cyber security

I was working as a retail assistant at a nature reserve after recovering from a long-term illness and was looking to start a new career. I had decided not to go back to financial administration, which is what I did prior to my illness. I wanted to refresh and expand upon my current skills, enhance my employability and work in an important and exciting field.

The bursary completely eased the financial pressure of funding full time study for a year. This allowed me to give my total concentration to the course. It also helped strengthen the image of the cyber security progression as an important career path that Government and others are willing to encourage.

I have been employed as a software engineer at a major UK technology firm since 2017. I work on their Graduate Leadership Development Programme, working at the cutting edge of software development in cyber security. I am finding that it is possible to make a real difference to cyber security in this career. I'm engaged by the fact that there is always something new to learn. I am planning to stay in this career and sector for some time.



GAINING QUALIFICATIONS FOR EMPLOYMENT

Beneficiary case study

David is a 43 year old white male residing in the North East of England. He has a Master's degree in Software Development and is currently a full-time Security Analyst

I want to develop my skills and qualifications

I wanted to improve my chances of gaining employment in the field of Information Security. I have a Master's degree in Software Development and several years of working in technology as a Systems Administrator plus other roles. However I wanted to move into cyber security and felt I needed further expertise. I studied part time and was a distance learner during this period.

I would not have been able to afford the course without the bursary and therefore would not have gained employment in a cyber security role. I am currently a Security Analyst for a leading technology security company.

The cyber security field is a growth sector and there are a lot of job opportunities coming along. I plan to continue working in the field, developing my skills further with professional qualifications such as CISSP and OSCP.



CAREER CHANGE OPPORTUNITY

Beneficiary case study

Anna is a 57 year old white female from the South West of England. She has a BSc in Mathematics and over 20 years experience in management consulting.

Businesses and the government have a big responsibility to make sure people are protected

I became interested in the MSc programme as a career change opportunity. I was running my own business advising SMEs on knowledge management and how to manage their client information. I had no prior cyber experience but I recognised it as an area where businesses and government have a big responsibility to do more for the population, their clients and in education, to make sure people are protected.

The bursary did influence my decision, but being able to study part time was more important. The bursary covered half of my course fees. Without it I would have had to take out some form of finance, I ended up doing that to some extent anyway but for a smaller amount.

I'm about half way through the MSc programme and am currently running an operational support team of 300 people for a bank. I'm looking to transition to a cyber role within the bank within the next six months to a year. I wouldn't be able to do that without having studied the MSc.



MSC LED TO FURTHER STUDIES

Beneficiary case study

Jane is a 48 year old white female living in the North West of England. She got her first post-graduate degree 25 years ago and was working as a freelance IT consultant prior to starting the cyber security postgraduate course.

I loved study and researching

I was working in IT and decided to go back to do a MSc in cyber security because of the skills and knowledge I would learn and gain. Having previously studied an Information Security module at the Open University, I applied to study the MSc on a full-time basis in 2017/18. The bursary application was part of the whole process.

Having my course fees covered was really important. It saved me using more of my savings to cover the cost of a year not working.

I am now doing a full-time, funded PhD on Values in Computing and Security. I loved the study and researching involved in the MSc course and I wanted to take it further. My plan is to finish my PhD, teach at university and/or go back into freelance work with security aspects.

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