## The University of Sheffield, Department of Chemistry

Athena SWAN submission 2015


Abbreviations Used:

| AS | Athena SWAN | PD | Postdoctoral |
| :--- | :--- | :--- | :--- |
| E\&D | Equality and Diversity | PDRA | Postdoctoral Research Associate |
| E\&DC | Equality and Diversity Committee | PGR | Postgraduate Research(er) |
| CiCS | Corporate Information and | PGT | Postgraduate Taught |
|  | Computing Services | PVC | Pro-Vice Chancellor |
| CiLT | Certificate in Teaching and Learning | R\&IS | Research and Innovation Services |
| CRS | Chemistry Researchers society | SAT | Self-assessment team |
| DoS | Director of Studies | SRDS | Staff Review and Development |
|  |  |  | Scheme |
| GTA | Graduate Teaching Assistant | SURE | Sheffield Undergraduate Research |
|  |  |  | Experience |
| HoD | Head of Department | TUoS | The University of Sheffield |
| HR | Human Resources | T\&R | Teaching and Research |
| IRF | Independent Research Fellow | UG | Undergraduate |
| NJTech | Nanjing University of Technology | WAM | Workload Allocation Model |

# Athena SWAN Silver department award application 

Name of university: University of Sheffield
Department: Chemistry
Date of application: November 2015
Date of university Bronze and/or Silver Athena SWAN award: 2009

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Athena SWAN Silver Department awards recognise that in addition to university-wide policies the department is working to promote gender equality and to address challenges particular to the discipline.

Not all institutions use the term 'department' and there are many equivalent academic groupings with different names, sizes and compositions. The definition of a 'department' for SWAN purposes can be found on the Athena SWAN website. If in doubt, contact the Athena SWAN Officer well in advance to check eligibility.

It is essential that the contact person for the application is based in the department.

## Sections to be included

At the end of each section state the number of words used. Click here for additional guidance on completing the template.

1. Letter of endorsement from the head of department: maximum 500 words

## To <br> Discover And Understand.

Sarah Dickinson
Athena SWAN Charter
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24/11/2015

Dear Ms Dickinson,

I am very pleased to write in support of our Department's Athena Swan 'Silver' award application. We were awarded 'Bronze' status in 2013 (with some valuable feedback). Since then we have implemented a vigorous programme to improve the representation of, and support for, female staff and students at all levels, and I am delighted to report clear signs of its success. The work of our 'Equality and Diversity' committee in close collaboration with the all the staff in the department have made clear progress in many areas. The E\&D group reports to our quarterly full staff meetings, so issues that they raise are regularly discussed by all staff: this has helped to ensure that E\&D issues are routinely embedded in our thinking, discussions and procedures. Some specific recent highlights are as follows.
(i) We have substantially increased representation of women at all levels from PhD students to professors. Our first two female professors (out of 14 professoriate) were appointed in 2013 and 2014, and this is ongoing with another female staff member currently being considered for promotion. We routinely consider all staff for promotion every year whether they apply or not.
(ii) Appointment of a group of female Graduate Teaching Assistants - PhD students who have a commitment to laboratory teaching - has made a remarkable difference to our recruitment of female PhD students, as the GTAs act as highly visible role models to undergraduates via their work in the teaching labs. Our first two groups of GTAs were all male, so for the third cohort we explicitly encouraged female applicants and recruited four female GTAs. Over two years the proportion of female PGR students, many of whom who were recruited from our own

To Discover And Understand.
undergraduate population, has nearly doubled from $23 \%$ to $43 \%$. The effect of this has been so striking that we will ensure that it continues.
(iii) Our support for early career researchers (particularly PDRAs) has substantially strengthened to try and fix the 'leaky pipeline' of female progression. We have provided financial support for a Chemistry Researchers Society that is now thriving; worked to increase the uptake of annual SRDS reviews which now includes a careers-focussed discussion; and encouraged participation in the award-winning faculty-wide training programme 'Think Ahead' for ERs.

Other improvements that have occurred over the last two years are summarised on page 36 of the submission document. There is clearly more to do but I hope that recent progress - which has involved a change in the way we operate that is becoming embedded in the department's culture - will be apparent. We are currently participating in a pilot of a university-wide scheme called 'Narrative Goals' which will encourage the department to look critically at its staff complement and ask what staff profile would we ideally like and what can we do to ensure that this is achieved as opportunities arise. This process will involve consultation with all staff in January 2016. We look forward to the result of this and to the execution of our Athena Swan action plan.

Yours sincerely

## Michael 1. Wand

Professor Michael D. Ward
[word count 500]

## 2. The self-assessment process: maximum 1000 words

The self-assessment team (SAT) is the Department's Equality and Diversity Committee (E\&DC) established in 2012. This includes male and female staff and students representing different roles within the department. The Committee meets quarterly examining all aspects of E\&D. Minutes and actions are circulated at all levels. The remit with respect to Athena SWAN (AS) is to analyse the Department's achievements, practices and data to produce an action plan. The action plan aims to ensure that all staff and students reach their potential, with particular focus on the recruitment, retention, and career progression and development of women. This work is embedded within the E\&DC's general objective and so the SAT will continue to meet in the same way in the future, with a standing agenda item to monitor implementation of the action plan.

Preparation of this document has required more frequent meetings as well as smaller working/task-and-finish sub-groups. Overall, the SAT has met 7 times over the year and subgroups have met twice. HEIDI/HESA, staff and student data were provided to us to analyse. E\&D is a standing item on Staff and Management Committee meetings and the progress of the AS submission as well as actions and queries have been discussed throughout the year in these forums. All staff were asked to participate in a departmental gender equality survey, to compare with previous results, and with the broader TUoS Staff Surveys from 2012 and 2014. Informed by the data, two focus groups have been held with postdoctoral research associates (PDRAs) and students, while the Chemistry Researchers Society (CRS) has facilitated discussions at their monthly coffee mornings. The application and action plan were circulated to all staff for input.

Harry Adams is a member of the technical staff and began working here in 1974. Harry has seen many changes over his time in Sheffield, and offers the team a long-term perspective. He recently served as Departmental Technical Manager and currently works part-time.

Michelle A Bates is a member of the secretarial staff and has worked in the Department for over 11 years. She works full time and is a single mother and offers a support staff perspective.

Jennifer Burnham is a Senior University Teacher ( 0.6 FTE). She is a member of the Departmental Laboratory and E\&D as well as two University-Level committees. She also leads the Faculty of Science Teaching Network. Jenny is married and has a son and a daughter. Although not eligible for the University WARP (Women Academic Returners Program) scheme, Jenny is benefitting from departmental financial support at an equivalent level to restart her Scholarship of Learning and Teaching following her return from maternity leave in January 2015.

Sarah Canning came to the department in 2007 to study for an MChem with a year in America, stayed to complete a PhD and has recently taken up a PDRA post. She provides a female student's perspective to the team, and is well placed to observe how the department has changed over the last 8 years.

Jane Grasby is a Professor. She joined the department as a lecturer in 1994. She serves on the Management, Executive, E\&D and Research Committees and is a member of Senate. She is also chair of the Faculty of Science E\&DC, a member of the University Gender Equality Committee and
the White Rose Women in Leadership Group and was the inaugural Chair of Women@TUoS NET. She is married to an academic and balances her working life with twin daughters, which included working part-time for 7 years. Jane brings a Faculty and Departmental Executive perspective to the team as well as experience of maternity leave and part-time working.

Richard F W Jackson is a Professor, moving to Sheffield from University of Newcastle in 2001. He has served as Head of Department (HoD) for two terms (2003-2007; 2011-2014), and has served on the Council of the University of Sheffield, is a member of the University's Finance Committee, Health and Safety Committee, and chairs the Senate Budget Committee. He has a special interest in supporting the career development of postdoctoral staff, something that was highlighted in the letter of support he wrote for the last Athena Swan submission by the Department. He brings experience of many aspects of the workings of the University to the committee.

Rosie Jarrald is a 3rd year undergraduate (UG) and provides input from a UG student's point of view.

Natalia Martsinovich is a Lecturer, joining the Department in 2013. She does research, teaching and is a member of the Departmental E\&D committee. She is married with a one-year-old daughter. She worked part-time at 0.8 FTE for a year after her return from maternity leave and benefitted from WARP, which enabled her to have a reduced teaching and administration load. She also provides an international staff perspective.

Andrea Rawlings is a PDRA with experience of working in several different departments at various Universities that had each achieved different levels of Athena Swan award. She sits on the CRS committee, allowing her to liaise directly between the E\&D committee and the wider research staff.

Sebastian G Spain is a Lecturer. He joined the Department in 2014 and provides the perspective of an early career researcher developing an independent research group and embarking on the other responsibilities associated with an academic post.

Sarah S Staniland is a Senior Lecturer. She is the Chair of the Departmental E\&DC and serves on the Departmental Management, Faculty and University E\&D Committees as well as serving as UCU secretary and Committee Member. She was UCU Officer for Equality and Diversity from 2014-15. She joined the Department in Oct 2013 directly after a period of maternity leave with her second child, and benefitted from the WARP scheme to extend her PDRA staff contracts. Her husband was one of the first men to utilise the new paternity leave laws, taking 2 months paternity leave from Oct 2013.
[Word count section 2: 974]

## 3. A picture of the department: maximum $\mathbf{2 0 0 0}$ words

a)

Chemistry at TUoS is a thriving teaching and research community, ranked $1^{\text {st }}$ in THE student satisfaction survey 2014 and first in the Russell group for overall student
satisfaction (NSS 2015) and in the top 5 for 3/4* research outputs (REF 2014). Our department was one of the founding departments of TUoS, begun in 1905 with penny donations from the people of Sheffield to create a University that would benefit the economy, their health and education, and that had international reach. Today, our teaching and research strives to meet these inspirational goals. Staff and students come from a diverse range of backgrounds and nationalities.

Chemistry at Sheffield has a friendly and collegiate culture. Our staff include 38 academics and 39 post-doctoral researchers supported by 30 technical and administrative staff. Approximately 40-50 PGR, 30 PGT (joint with engineering) and up to 200 UG students join the department each year. We have a collaborative programme with Nanjing University of Technology (NJTech) in China admitting 60 undergraduate students annually in China. After completing a curriculum delivered by our staff in Nanjing, approximately $2 / 3$ come to Sheffield for their final year.

TUoS is committed to "Excellence through Inclusion", is a Bronze AS award holder (submitting for Silver in November 2015), and has a number of positive action initiatives designed to enhance the recruitment, retention and progression of women in STEMM subjects. Chemistry is committed to these values and aims to embed E\&D within its policies and culture, recognised by a Bronze AS award in 2013. Our staff play active roles in Faculty and University E\&D boards and the University Gender Equality Committee. Athena Swan activities are a standing item at departmental committees and in student forums, demonstrating how E\&D is mainstream and established in the department.
[Word count section 3a: 291]
b)

## Student data

(i) Numbers of males and females on access or foundation courses

Not applicable
(ii) Undergraduate male and female numbers.

The Department offers full-time courses in "Chemistry" (BSc, MChem), "Chemistry with Biological and Medicinal Chemistry" (MChem), and "Chemical Physics" (MPhys). Our portfolio of MChem courses include years in Industry or overseas, and we offer a joint BSc with NJTech. The department does not run any part-time UG courses.


Figure 1. Proportion of female students starting an undergraduate course (combined all Bsc and MChem/MPhys) in chemistry at Sheffield (• and solid line) compared with the average for the Russell Group chemistry departments (, HESA Data). Horizontal dotted line is the benchmark supplied by Athena Swan for 2012/13. Total student numbers per annum are overlaid.

Figure 1 shows the admission gender profile for Sheffield-based undergraduate courses. Females are $40 \%$ of our cohort, consistent for 8 years. This is comparable to both the Russell Group and the national average (42\%). Figure 2 shows the gender profile on BSc and MChem/MPhys separately. It is encouraging that female representation on MChem/MPhys courses is increasing as these are intended for those interested in pursuing a STEMM career. The first cohort of 22 TUoS/NJTech students graduated in 2014-15 (27\% female).

Figure 3 shows the proportions of female and male students admitted to BSc and MChem/MPhys courses split by gender. There was a decrease in the MChem/MPhys proportion over 2012-2014 for both female and male cohorts, and the proportion of female students admitted for an MChem/MPhys compared to BSc currently exceeds that of male students.

In addition to the initiatives launched in our last AS submission [Action plan highlights (1)], our new UG brochure includes more female role models and images. We aim to increase the number of females at undergraduate level to match, or exceed the national average [Actions 2a].


Figure 2. Proportion of female students starting undergraduate chemistry BSC (•) and MChem/MPhys (o) courses in Sheffield. Total student numbers per year are overlaid (BSc top, MChem/MPhys bottom)


Figure 3. Proportion of female and male students admitted to BSc and MChem/MPhys courses in chemistry at Sheffield compared to total for respective gender.
(iii) Postgraduate male and female numbers completing taught (PGT) courses

The Department offers a specialist PGT course in "Polymers for Advanced Technologies" that mainly attracts applicants from overseas, with no part-time applications. The cohort's female proportion has increased from $35 \%$ to $43 \%$ between 2011 and 2014 and is now comparable to the national PGT average (45\%). However, with the small cohort sizes, both in Sheffield and nationally, we are cautious to interpret this as a success until further data is available. We will
continue to monitor admissions [Action 1.1], with reference to application data (Section v).

Our previous application detailed plans to introduce a general "Chemistry" MSc course. Although outside the census of this submission, $60 \%$ of the first cohort (admitted 2015) are female.


Figure 4. Proportion of female students starting a postgraduate taught course in chemistry at Sheffield ( $\bullet$ and solid line) compared with the average for the Russell Group chemistry departments ( $x$, HESA Data). Horizontal dotted line is the benchmark supplied by Athena Swan for 2012/13. Total student numbers per annum are overlaid.

## (iv) Postgraduate male and female numbers on research degrees

Chemistry has approximately 150 PGR students, with around 40-50 starting each year. We had one female part-time application, offer and acceptance onto the degree in 2013, and one application with no offer in 2014. Our previous application noted PGR offer and acceptance rates were comparable for both genders, but with a lower number of applications from females. Further investigation using focus groups identified lack of information regarding PGR study and careers, inadequate numbers of visible female role models, and the need for earlier application/acceptance for PGR study as contributing factors. As a result, the relevance of PG study is introduced to UGs at all levels, and those performing at 1st class level are individually invited to consider PGR study. PhD studentships are allocated (to staff) earlier in the year allowing earlier application deadlines and offers.

Fig. 5 shows the representation of females is still lower than males, but has increased significantly from $26 \%$ to $43 \%$ between 2012-2014. Our proportion of female PGRs is now above the national average (40\%) and that of the Russell Group.

Female representation in publicity materials (see Fig. 11) has been increased and the number of female GTAs (PGRs heavily involved in UG teaching, so highly visible to UGs) has significantly increased from none in 2013 to $43 \%$ in 2015 (Fig. 6). This was achieved by the HoD explicitly inviting females to apply for GTA posts (arising from the 2013 action plan). Our female PGR representation now reflects our UG figures, indicating repairs to the "leaky pipeline". We will continue these initiatives, monitoring PGR application rates to ensure this promising start is built upon [Action $1.1 \& 2 a .5]$.


Figure 5. Proportion of female students starting a postgraduate research degree in chemistry at Sheffield (• and solid line) compared with the average for the Russell Group chemistry departments ( $x$, HESA Data). Horizontal dotted line is the benchmark supplied by Athena Swan for 2012/13. Total student numbers per annum are overlaid.


2014 Cohort



Figure 6. Images of GTA for each cohort and the gender split of GTSs by year. Total numbers per annum are overlaid.

## (v) Ratio of course applications to offers and acceptances by gender for undergraduate, postgraduate taught and postgraduate research degrees.

Our UG courses require ABB (BSc) or AAB (MChem), or equivalent. We make offers to all candidates predicted to achieve these qualifications. Fig. 7 shows that female applicants are more likely to receive an offer than males, while the acceptance ratio is similar. We make $80-90 \%$ of female applicants an offer, so there is little scope to significantly increase female UG representation by making more offers, and alternative strategies are required to increase female applications (see section 3b).

We have recently introduced a requirement for Biology, Maths or Physics, in addition to Chemistry. This is to ensure the best education for our students and increase retention to completion. We were concerned this change might influence our gender balance, as females are under-represented in A-level Maths and Physics, but the 2015 intake shows a slight increase in female applications (43\%). We will continue to monitor the process for any negative effects.

Our "conversion rate", (percentage of offers resulting in acceptances) averages $\sim 25 \%$ with little gender difference, so the main barrier to increased female representation is the initial application numbers. Feedback from the University "decliners' survey" indicates that a lack of female representation on open/interview days is a factor. Although we endeavour to increase the visibility of female role models on these occasions we recognise that, due to smaller number of female staff, this places an unfair burden upon them. In addition, the increased number of open days at weekends is problematic for staff with caring commitments. We are currently petitioning TUoS to provide child care facilities on these occasions to allow more staff to participate, and to reducing the burden on staff without caring commitments [Action 2a.2-3]. Our admissions officer ensures that applicants' tour groups are gender balanced, with a good gender mix of tour guides.


Figure 7. Offers and acceptances for undergraduate degrees for females as a proportion of total female applicants and males as a proportion of total male applicants. Percentage of acceptances from offers (conversion rate) for female ( $\bullet$ ) and male students (o). Total applicants per annum are overlaid.

The numbers of students applying for our PGT course are small. Applications from female students average 40\%, comparable to our UG and PGR numbers. Female applicants are more likely to be made an offer than male applicants and the take up is similar for both (Fig. 8).


Figure 8. Offers and acceptances for postgraduate taught degrees for females as a proportion of total female applicants and males as a proportion of total male applicants. Percentage of acceptances from offers (conversion rate) for female ( $\bullet$ ) and male students ( 0 ). Total applicants per annum are overlaid.


Figure 9. Offers and acceptances for postgraduate research degrees for females as a proportion of total female applicants and males as a proportion of total male applicants. Percentage of acceptances from offers (conversion rate) for female ( $\bullet$ ) and male students ( 0 ). Total applicants per annum are overlaid.

The number of offers and acceptances to female PGR applicants has increased (Fig. 9), with female applicants now being more likely to be offered and accept a PGR position compared to their male peers. The proportion of female applicants has increased from $28 \%$ to $37 \%$ from 2011-2014, which we attribute to the initiatives outlined above in section 3 b (iv). One concern is that our conversion rate dropped last year, indicating that although we are attracting more female applicants this may not lead to increased numbers. The numbers are small and will be monitored over time to judge their statistical significance, alongside research to identify any issues we can address [Action 1.1].

## (vi) Degree classification by gender

There is some annual variation in degree classification but overall there appears to be no gender bias. Grade distributions are more consistent year-on-year for female cohorts, with between $32-34 \%$ and $39-43 \%$ achieving 1st and 2.1 degrees, respectively. In future, we will measure our impact on attainment by comparing degree classification by gender with incoming A-level results by gender (to identify any gender attainment gap) [Action 1.2]


Figure 10. Distribution of degree classifications for MChem/MPhys and BSc undergraduate chemistry courses. Data for female students plotted as a proportion of the total number of female students (pale grey), and male students plotted as a proportion of the total number of male students (dark grey).


Figure 11. A selection of imagery found in departmental publicity materials and Resonance, a magazine produced by students in the department.
[Word count for Section 3b student data: 1131]

## Staff data

(vii) Female:male ratio of academic staff and research staff


Figure 12. Trends in female representation in the last three years for all teaching and research staff (filled circles), researchers (R) (triangles) and academic teaching (T) and teaching and research (T\&R) staff (squares). A more detailed analysis of academic staff by job role and level and the numbers of staff at each grade/role by gender is shown below for each year in Figures 13 and 14 respectively.

Although women remain underrepresented in staff positions, the proportion of female staff (researchers and academics) increased from 19 to 30\% (Fig. 12). In part this is due to an increase in women academics (9 out of 38). In addition, a dramatic increase in the representation of females at the PDRA level occurred in 2013-14. Prior to the AS process, underrepresentation of females at the PDRA level in Sheffield was evident (2011-12 20\% cf. $28.4 \%$ nationally, Fig. 12 \& 13). The proportion of female researchers is now $36 \%$, significantly above the national average ( $29.9 \%$ in 2012-13). This increase is due both to an increased proportion of female applicants for posts, and an increased success rate upon application (see section 4a). We tentatively ascribe this to the shift in culture and raised awareness since our last AS application, and we are investigating the causes through a focus group [Action 2b.6].


Figure 13. Trends in female academic staff representation analysed by job role (teaching (T) or teaching and research (T\&R)) and level (professorial (P) or non-professorial (NP)) over the last three years.

The percentage of female T\&R academics in Sheffield has risen modestly (from 17 to $22 \%$ ), and is comparable to the national average of $18.9 \%$. Two new female T\&R staff were appointed. Female teaching staff decreased from 50 to $33 \%$ and are currently lower than national averages (43.5\%), due to the appointment of two male teaching associates. One of these was maternity leave cover for a female teacher. Females made up between 26 and $33 \%$ of the non-Professorial academic staff, similar to national averages (29.8\%, 2012-13). Approximately $40 \%$ of academic staff are Professors and in 2011-12 these were exclusively male. By 2013-14 the representation of women in the Professoriate (14\%) compared favourably with national values (8.5\%, Figure 13).

The distribution of staff by role and level shown in Figure 14 illustrates the career progression of women, with the department achieving two notable firsts: our first two senior university teachers (both female) and our first two women professors. The number of female lecturers and senior lecturers has increased although, following promotions, the number of female Readers has decreased. One female was promoted to Reader in the latest promotions round, sustaining the pipeline to Professor. Actions to support the progression of female academics and to increase the proportion of female PDRAs are discussed in section 4. Recently we have begun piloting a HR initiative to develop Departmental narrative goals for diversity and inclusion within workforce planning (see Section 5 \& Action 5.5).


Figure 14. Numbers of academic staff in chemistry analysed by staff group for the last three years. Our university and senior university teacher titles are the equivalent grade to lecturer and senior lecturer for teaching and research staff.

Combining staff and student data allows a measure of our impact to be explored (Fig. 15). In academic years 2011/12 and 2012/13, the decrease in the Sheffield pipeline from undergraduate to researcher ( $\Delta_{U G-R}$ ) was $-23 \%$ and $-18 \%$, but only $-3 \%$ in 2013/14. This figure compares favourably with national averages where $\Delta_{U G-R}=-$ 14.4 and -12.4 in 2011/12 and 2012/13 respectively (Fig. 15). A high priority is to sustain and build upon this progress [Action 2a.5, 2b.1-5, 3.3, 3.7 \& 3.8].


Figure 15. Trends in female representation for undergraduate starters (UG), postgraduate starters (PGR), post-doctoral researchers (R), non-professorial academic staff (NP) and professorial staff (P) in Sheffield over the last three years. In 2013/14 these data show a substantial difference post-Athena Swan.


Figure 16. Trends in female representation for undergraduate starters (UG), postgraduate starters (PG), post-doctoral researchers (R), non-professorial academic staff (NP) and professorial staff (P) in Sheffield in 2013/14 and nationally in 2011/12 and 2012/13.

## (viii) Turnover by grade and gender

The turnover of female researchers $2011 / 12$ to $2013 / 14(18 \%, 25 \%, 20 \%)$ is comparable to the number of female researchers in post ( $20 \%, 22 \%, 36 \%$ ) except in 2013/14 when a larger number of females were appointed to posts that presumably extend longer than one year. Turnover in other areas is low and no meaningful conclusions can be drawn: 2 male and 1 female academics; 2 male
technicians; 1 female clerical and secretarial staff member; 1 female and 2 male management and professional staff members. The academics who left were 2 university teaching staff ( 1 female maternity leave cover, 1 male who completed a secondment and returned to teaching) and 1 professor (retirement).
[Word count for section 3b Staff data: 578]
[Total Word count for section 3: 2000]

## 4. Supporting and advancing women's careers: maximum $\mathbf{5 0 0 0}$ words

## Key career transition points

a)

## (i) Job application and success rates by gender and grade

44 PDRAs were appointed over the census period. In successive years $25 \%, 24 \%$ and $33 \%$ of the applicants, and $18 \%, 39 \%$ and $56 \%$ of the successful applicants were female. Annual success rates for men ( $9 \%, 5 \%$ and $3 \%$ ) and women ( $6 \%, 10 \%$ and $7 \%$ ), with the average (over the three year period) success rate for women (8\%) slightly greater than that for men (6\%).

Seven academic staff were appointed, including two male teaching associates, one female and three male lecturers and one female senior lecturer. For the T\&R posts only $12 \%$ of applicants were female, but the success rate for women (5\%) was higher than for men (3\%). For teaching posts, which were fixed-term when advertised, $22 \%$ of the applicants were women, although none were appointed.

Eight management and professional appointments were made, one male and seven females. $57 \%$ of applicants were female, and the success rate for women (12\%) was significantly higher than for men (3\%). Three technician appointments were made, one male and two female. $37 \%$ of the applicants were female and women (5\%) were more likely to be successful than men (1.5\%). One female clerical and secretarial appointment was made.

In general, success rates for females are higher than those for males. Therefore increasing the number of females appointed requires an increase in female applications [Actions 2b.1-5].

Currently this data is provided to the SAT as applications and success rates for each staff grouping in each census year. This does not allow the direct linking of applications and outcomes, hindering valuable learning opportunities. We plan to improve this data set [Action 1.4].

## (ii) Applications for promotion and success rates by gender and grade

Five female and seven male academics applied for promotion in the last four years (Table 1). All were ultimately successful. Of non-professorial staff in 2011-2012, $71 \%$ of female academics (5/7) and $54 \%$ of males ( $7 / 13$ ) were promoted over the last four years. Three female clerical and secretarial staff, one male management and professional, and one male technician were also promoted.

| Year | Promotion to | Gender |
| :--- | :--- | :--- |
| $2011 / 12$ | Professor | Male |
| $2012 / 13$ | Reader | Male |
|  | Reader | Male |
| Professor | Female |  |
|  | Reader | Male |
|  | Professor | Male |
|  | Senior University Teacher | Female |
|  | Senior University Teacher | Female |
| $2014 / 15$ | Professor | Male |
|  | Reader | Male |
|  |  | Female |

Table 1. Academic Promotions 2011-2015
Since it is recognized that females (and some males) may be reluctant to put themselves forward for promotion, all academic staff are invited to submit a CV annually. This has been a departmental procedure since 2012 but is not normal policy in TUoS. Thus every eligible member of the department is considered by the promotions panel (executive committee) each year without them specifically having to ask. Staff who want advice/feedback on CVs and promotion are invited to discuss this with the HoD and through the annual Staff Review and Development Scheme (SRDS).
b)

## (i) Recruitment of staff

Academic posts are advertised widely. Recruitment materials include a positive action statement detailing our E\&D and family-friendly policies, is particularly aimed at encouraging female and ethnic minority applicants. For academic posts, the HoD invites academic staff to contribute to longlisting, and longlisted applications are assessed independently by selection panel members, who subsequently meet to agree the final shortlist that is invited for interview. Where possible, interview dates are arranged around the availability of the applicants, and they are informed of the schedule well in advance. Alternative arrangements are made (e.g. Skype) if necessary. The schedule for the interview day(s) includes an informal dinner with the HoD and relevant staff, a tour of the Department, an open research talk, a teaching meeting, an informal lunch with staff not on the interview panel and the formal interview. This schedule allows candidates to speak to staff not on the selection panel. Inability to attend the dinner (e.g. because of childcare issues) would not affect prospects of appointment.

Interviews for academic staff are chaired by the Faculty PVC, who is a member of the Chemistry Department and Chair of the University E\&D Board. The panel comprises the HoD, 3-5 academics (at least one from a different department), and a representative from HR. Chairs of all selection panels have completed equal opportunities and diversity training; seven members of the department, including the HoD, currently have this training. The faculty PVC, HR representative and seven departmental members have been trained in how to avoid unconscious bias. Panels in Chemistry typically contain at least two females and at least three members trained in E\&D and avoidance of unconscious bias. We intend to increase the number of staff who have been trained. We are working with HR to improve our recruitment and selection materials and procedures, and to further develop our talent attraction strategy [Actions 2.2 \& 2b.1-4].

At the PDRA level, applicants are shortlisted and interviewed by the lead academic and at least one other staff member, one of whom has been trained to chair panels, although access to this training has been limited over the last year [Action 2.2]. Typically, an interview day would additionally include a tour of the department and meeting with the research group.

## (ii) Support for staff at key career transition points

Our "leaky pipeline" (Fig. 14) shows that our current key transition points are (1) PDRA to permanent academic staff and (2) progression to Professor. The support afforded to female academic staff for preparation of promotion cases, and for all staff surrounding maternity/paternity and maintaining work-life balance (flexible working), are detailed subsequently. We therefore focus on additional support here.

Supporting and Developing Research Staff. To support PDRAs and PGR students, the Department supported the establishment of a Chemistry Researchers Society (CRS) in 2013. The CRS aims to facilitate social interactions and mutual support, promote professional development, and represent researchers within the department. The society is self-run, with support from the department. The CRS is thriving and hosts a well-attended monthly coffee morning with discussion themes (e.g. developing researcher induction materials, E\&D), that is supplemented by events such as career talks from visiting industrialists. We have encouraged staff interaction with the society to ensure support is increased for female PDRAs [Actions 3.8].

Researchers are encouraged to participate in a wide range of career development opportunities available university-wide through the award-winning "Think Ahead" programme. In our gender survey, $100 \%$ of PDRAs indicated they were encouraged to take up career development opportunities. The "Think Ahead" provision includes an induction event "Getting the most out of your postdoc", and a range of courses including writing skills (for manuscripts and fellowship applications), research management, management of others, and media training. Additionally, PDRAs can apply with UGs to the Sheffield Undergraduate Research Experience scheme to supervise a UG student on the PDRA's project.

The faculty runs a mentoring programme for PDRAs and independent research fellows (IRFs). Several of our PDRAs have participated and our male and female academic staff act as cross-departmental mentors. In our gender survey $73 \%$ of PDRA staff reported that they were provided with useful mentoring opportunities, with $18 \%$ of responders choosing the 'don't know' option, implying that increasing the profile of this provision is required [Action 3.3]. Furthermore, Springboard, a women-only personal and professional development programme, is run for female PGRs, PDRAs, IRFs and early career academics. Female Chemistry staff support the delivery of Springboard by sharing their career experiences, and female staff and students have participated. In our gender survey, $90 \%$ of all PDRAs and $100 \%$ of female PDRAs 'agreed' or 'strongly agreed' that the department is a great place for women to work.

University Networks. Female researchers, IRFs and academics are members of Women@TUoS NET, the University of Sheffield's Women's Staff Network, which offers a monthly programme of events and development courses. Recent events have included a programme of workshops such as leadership ladder; visiting and internal speakers, alongside practical initiatives such as CV+ (a CV mentoring scheme) and a writing club. Through this one of our female technicians, a part-time PhD candidate, was able to find undisturbed thesis writing time, accelerating the completion of her PhD. Also of note are the popular 'Speed Networking' events aimed at female PDRAs, where female academic staff, HR and career advisors give advice related to progression of research careers, interviews and the challenge of work-life balance. A similar PGR targeted event also runs. Male and female staff use other staff networks such as the LGBT network and Parents@TUoS, which provides support through a quarterly coffee morning and information for all parents within
the University. TUoS has a Women Professors' network that aims to influence within the University and provide peer support. Both the Department's female Professors are members.
[Word count for Section 4 Key career transition points: 1362]

## Career development

a)
(i) Promotion and career development

## The Staff Review and Development scheme (SRDS)

SRDS is an opportunity for all staff to reflect on the highs and lows of the previous year and agree objectives for the next. SRDS reviewers are senior academic colleagues, or in the case of PDRA and support staff, generally their line manager; SRDS reviewers undergo training, including in E\&D. At the start of the 2015 SRDS process, reviewees were given the opportunity to request a change in their reviewer, before that reviewer had been approached, so as to ensure that reviewees were comfortable with the appropriateness of their reviewer. During the SRDS meeting targets are set for the next year and training/development needs are identified. As a result of careful reflection, TUoS has agreed (2015) that a numerical assessment of contribution is no longer to be made, since this was felt to distract from the developmental goals of the process. For academic staff, the full remit of the Sheffield Academic i.e., teaching, research (or scholarly activity for teaching staff), leadership and administration, and impact activities (e.g. outreach) is considered. In the departmental staff survey, academic staff responses to questions about whether all aspects of the job are taken into account in SRDS ( $82 \%$ positive) and promotions ( $67 \%$ positive) are each more positive than in 2013 ( $66 \%$ and $59 \%$, respectively). New academic staff have regular meetings with their probationary advisor during their probation period (generally three years), in place of SRDS.

The uptake of SRDS within the Department has increased from $52 \%$ to $81 \%$ over the last four years (Fig. 17). Prior to the 2014 SRDS round, we organised a Departmental refresher briefing for all staff. From 2013-2014 SRDS uptake from academic staff rose from $61 \%$ to $75 \%$. Of those staff who participated in SRDS, $66 \%$ report that it was useful, with $15 \%$ 'don't know' and $19 \%$ disagreeing. This is a small decrease from 2013 positive figures (72\%). Amongst academic staff, positive answers have declined from $79 \%$ to $62 \%$, despite (or perhaps because of) an increase in academic participation over this period. The staff groups that were least positive about SRDS were technical and administrative staff (positive $56 \%$ and $40 \%$, respectively). However, 15 staff (including males and females from all staff groups) chose SRDS as the most useful career development opportunity, so clearly experiences are very variable. Our conclusion is that encouraging participation in SRDS is only part of the
solution, and that an action for all staff, SRDS reviewers and reviewees alike, is to reflect on how they can make the process more useful [Action 3.2].


Figure 17. SRDS participation rates for all staff in the Department over the last four years.
A particular issue with PDRA participation in SRDS (14\%) was identified in 2011. Explicit encouragement of both reviewers and reviewees by the HoD, from 2011 onwards, had a significant impact, but the combination in 2014 of specific training for reviewers related to the needs of PDRAs, and a bespoke SRDS form for researchers that emphasises career development, have clearly had a major impact. Consequently current PDRA participation rates are now 87\% (Fig. 17), and all (100\%) PDRAs reported that they had been encouraged to take up career development opportunities. This is arguably the greatest impact that we have seen.


Figure 18. SRDS participation rates for research staff (PDRAs) over the last four years in the department.

## Promotions

The department places emphasis on well-rounded promotion cases that include all aspects of the "Sheffield Academic". In assessment of research publications, both quality and quantity are considered, with the differing publication practices of the sub-disciplines of chemistry taken into account, as well as adjustments for special circumstances and factors such as maternity leave and part-time working. The department recommends cases to the Faculty panel for further consideration. Throughout the promotion procedure, those involved in recommending, assessing and confirming promotions take particular note of the special circumstances of staff who are, or who have been, on part-time contracts.

Specific promotion criteria exist for research-only, teaching-only and T\&R cases. The Science Teaching Network, led by Dr. Jenny Burnham from Chemistry, matched specific teaching-based activities to the relevant promotion criteria for teaching staff. This document was agreed by the Faculty Executive Board, is publicly available, and assists with preparing and developing promotion cases for teaching and T\&R staff. This work formed the basis of the University "Expectations of Teaching Pathway Roles".

Staff are supported to develop promotion cases through (i) SRDS; (ii) advice from the HoD on request, and feedback to candidates in unsuccessful cases; (iii) annual research meetings with the HoD and research cluster heads. These meetings are supportive discussions with senior colleagues, during which research plans for the following year are discussed.

## TUoS Development opportunities

A wide range of staff development activities are available within TUoS. These include courses provided by HR (e.g. networking, project management, work-life balance), training related to preparation of funding applications from Research and Innovation Services (R\&IS) and specific women-only development options through Women@TUoS NET. Staff can develop their teaching through participation in the Science Teaching Network and through staff development provision led by Learning and Teaching, and Student Services. Each year the department nominates staff to participate in the "Sheffield Leader" programme, available at four different levels to develop junior and senior staff. 5 women and 9 men from Chemistry have completed, or are currently taking, Sheffield Leader since it was introduced in 2010 [Action 1.3]

Two cross-university mentoring schemes cover (i) female lecturers paired with senior male and female mentors ("Impact") and (ii) senior female academics paired with PVCs ("Futures"). Members of the department have participated in both of these schemes as mentors and mentees. The objective of both schemes is to increase the University's key performance indicator of the proportion of women in professorial posts and in leadership and governance.

## (ii) Induction and training

All new academic staff starting in the Department receive practical support including start-up funding, departmental studentships and a gradual increase in teaching and administrative duties. All new academic staff have a mentor (a senior academic) particularly for research activities, and teaching development is supported centrally by our HEA-accredited Certificate in Learning and Teaching (CiLT). Furthermore, all staff can access the TUoS on-line induction pack and attend an induction event. Additional training opportunities are available via specific central departments (e.g. funding workshops run by R\&IS).

However, feedback from recently appointed academic staff suggested that, although strategic mentoring for career development was very good, more practical day-to-day support (who is responsible for X?) was lacking. Consequently, a focus group of recent appointees across all grades and job roles assessed induction. Induction of staff was variable across the Department, with technical staff reporting a highly structured process, whereas researchers and academic staff found the process variable and prone to assumptions of prior knowledge. It was noted that much of the information that new staff needed was available but finding it was difficult.

The focus group recommended two actions, which were acted upon immediately. 1. Learn from the technical staff induction process and develop a formal process for all new staff joining the Department. 2. Development of a new staff intranet to act as a single central repository of all information staff need including training and additional university support available (both practical like purchasing procedures and managerial like E\&D training). Once the induction process is formalised this will be deposited here too [Action 3.5 and 5.1]. Furthermore, the chairs of the E\&DC and the CRS are working together to ensure research staff receive this information as well as any additional information they need. In prototype form our new processes have been trialled on two new academics with positive feedback.
"My first day was very well organised. Everyone was very welcoming and friendly"

Dr. Robert Dawson, New academic started beginning of November 2015

## (iii) Support for female students

UGs are assigned a personal tutor who provides pastoral support; this provision was 'highly commended' in a recent teaching review, and the 2015 NSS Survey revealed our students rate the support they receive more highly than those of any other Russell group Chemistry Department. Students can request a female tutor. Sprint (a

UG orientated form of Springboard) is offered to female UG students and is advertised within the Department.

PGRs are assigned an independent advisor who monitors their progress. Formal meetings with the independent advisor (at 1, 6, 12-18 and 24 months) provide an opportunity to review progress and discuss future plans. Additionally, the student may contact the independent advisor at any time for support. The Department encourages regular meetings with the supervisor, both formal and informal, to plan and provide feedback on student progress. This combination provides a wellstructured network for provision of both academic and pastoral support.

PGRs are enrolled in the Doctoral Development Program, through which opportunities for personal development are identified. These training opportunities include advanced subject-specific training and craft skills, broad scholarship training and wider engagement in the scholar community, and generic research skills. An annual personal Training Needs Analysis is carried out with input from both supervisor and independent advisor to identify the most relevant training for each student, and review progress. A wide range of training courses is provided by the "Think Ahead" researcher development program and the Women's Network offers PG student-targeted events which are well attended by female chemists. Female PGRs are encouraged to attend the Springboard personal and professional development program for women.

The CRS caters for both PGRs and PDRAs, offering a mixed program of coffee mornings to discuss issues relevant to researchers, lunchtime seminars allowing researchers to present their work, and outside events such as careers seminars. This provides a valuable opportunity for informal networking between PGRs and PDRAs.

The Department offers a regular lunchtime seminar program where external academics speak. As a result of the department's AS Bronze award Action Plan, more female speakers are being invited to increase visibility of female role models [Action 5.8].

Mentoring is available at all levels of study: UG students can enrol on a mentoring program where experienced students are assigned to share their experience, whilst PGR students and early career researchers can receive both thesis and career mentoring through the Think Ahead program.

Career support is widely available for all students, from UG to PG, through the University Careers Service including one-to-one careers consultations, CV surgeries and a ShefChemCareers Twitter account which highlights relevant opportunities. Moreover, career support and employability skills are embedded within the UG curriculum (e.g. modules like "Skills for Success"), including raising possibilities for PGR study. Additionally, there is a lunchtime seminar program within the Faculty of Science where ex-PGR students present their personal experience of career options.
[Word count for section 4 career development: 1698]

## Organisation and culture

a)

## (i) Male and female representation on committees

Female representation on departmental committees is shown in Fig. 19. In some cases the membership of committees depends on departmental roles (e.g. the Director of Studies (DoS) chairs the teaching committee), but other committee vacancies are advertised in the Department and volunteers are sought. In 2012, the E\&DC reviewed older data (2009-10, 2010-11) and found that women were significantly under-represented ( $11 \%$ of total committee members). The E\&DC suggested that the then HoD consider this issue. Representation of women on departmental committees has increased from $11 \%$ to $26 \%$ over the four-year period. The current proportion of female committee members ( $26 \%$, Fig. 20) is now in line with the proportion of female academic staff (24\%).


Figure 19. Female representation on departmental committees 2012-2014.


Figure 20. Female representation across all committees in the Department.

## (ii) Female:male ratio of academic and research staff on fixed-term contracts and open-ended (permanent) contracts

Almost all academic staff, and all women on the academic staff, are on open-ended contracts. During the census period two male teaching associates have had fixed term contracts. There is one male research staff member with an open-ended contract. All other researchers are on fixed-term contracts. Thus, $37 \%$ of the fixed term contracts and $22 \%$ of the open-ended contracts are held by women. This reflects the current proportions of female research and academic staff. The openended figure ( $22 \%$ ) is very similar to the national average of $21.6 \%$. The figure for fixed ( $37 \%$ ) is higher than the national figure ( $33.3 \%$ ) likely reflecting higher female representation than average at the PDRA level.
b)

## (i) Representation on decision-making committees

When positions become available on Departmental committees, the HoD invites applications, based on the competencies, interests and current workload of prospective members, not their gender. The department recognises the benefits of diversity; female staff are deployed strategically (including as members of the Executive and Management Committees) to maximise the impact of their contribution and to prevent overload. We will continue to monitor gender balance [Action 5.6]. Information about opportunities on University committees is distributed via central email through the department and we plan for the executive committee to strategically assess and invite membership [Action 5.7].

## (ii) Workload model

The Department balances teaching, pastoral, research, and administrative duties. Academic administrative loads differ, with the HoD, DoS, and the undergraduate admissions tutor (currently all posts held by men) carrying the heaviest workload, and each have dedicated administrative support. The HoD role rotates on a fouryearly basis. The administrative duties of the undergraduate admissions tutor have been shared between three members of staff to avoid overloading a single individual. Junior non-probationary members of staff are given administrative duties such as undergraduate year directors, who sit on the teaching committee. One of the four UG year tutors is female. Such roles contribute to the well-rounded case for promotion that the department likes to put forward in keeping with the tenets of the "Sheffield Academic". We have software for work allocation and are working to make it reflect our values. The position of individual staff in the work allocation model (WAM) was made transparent to staff last year; staff were shown their data in the context of anonymised departmental data and some staff found this data useful [Action 5.3]. However, the staff resource required to enter the large amounts of data required to sustain the WAM have proved difficult this year and will continue with the current manual system. The department will reflect on how to make the WAM workable in the future [Action 5.3].
(iii) Timing of departmental meetings and social gatherings

As a Faculty we have agreed that core hours are 9.30 am to 4.00 pm and that departmental meetings will take place between these hours. In addition, teaching responsibilities are scheduled to accommodate flexible working patterns, absences, and caring responsibilities [Action 4.3]. Informal swaps and covering for colleagues is a common feature of our collegiate culture. When social gatherings are "out of hours" we encourage families to attend. For example, last year's Department Social was Sunday lunch in the University pub and whole families attended.

## (iv) Culture

> "Working here is actually amazing. Everyone in the group works very hard and supports each other to work towards a common research focus. Also the regular and friendly communication within the group is a very good support during my PhD"

Overseas PGR Student (Female)

We run a bi-annual gender culture survey and the results (and some quotes) from this are reported here and to the department [Action 1.6]. We aim to be the place of choice for women (and men) to work and study. We make sure our environment is welcoming, friendly, collegiate and supportive for all staff and students.

Therefore, we do not tolerate any type of harassment. This policy is unambiguous to staff as evidenced the fact that $87 \%$ of our staff were confident that harassment would be dealt with effectively.
$89 \%$ of all Departmental staff, $95 \%$ of academic staff and $100 \%$ of female academics agree that work related social activities are welcoming to both women and men. Social events held by the department are inclusive and children are welcome [Action 5.9].

We celebrate the diverse achievements of our staff and students. 96\% of academic staff agree that the Department recognizes and celebrates the work achievements of staff irrespective of gender. Regular events are run for charity by staff and PGRs. These, alongside our student achievements and outreach events, are as likely to be celebrated on our Departmental News pages as our academic successes [Action 5.10].

In my opinion they are very supportive of gender equality and give excellent leadership on these issues.

Research Staff Member (Female)

The Athena Swan Award is a source of pride in the Department.
Research Staff Member (Male)

In our gender survey 73\% of all our Departmental staff were aware of the Athena Swan Charter, $94 \%$ agree they understand the Department's reason for engaging with gender equality and $88 \%$ understand why positive action may be required.

## (v) Outreach activities

The Department offers a range of outreach events in a dedicated laboratory. Schools may book this laboratory free of charge, and teachers bring up to 15 students to perform experiments which may be impossible at their school. The students also get the opportunity to see the Department and experience a day at University. During the academic year, we host schools' competitions, such as the Salters Festival, Reactiv8, SOAMS, and the Kroto events, using the main undergraduate laboratories, where we can accommodate up to 45 students at a time. We participate in Discovering STEM aimed at female Y9-11 pupils and a University options event for female Y12 students of maths, physics and chemistry to publicise options in the physical sciences and engineering. Currently, the staff leading outreach are all female, but a mix of female and male UGs and PGRs deliver these events. Many staff are involved in schools lectures, and two of our staff
members have delivered the Royal Institution Christmas lectures. We share our university and our research with our city twice-yearly on "Researchers Night", with the involvement of chemistry staff and students. Outreach is included in the workload allocation model, is discussed in SRDS and considered in promotion.
[Word count for section 4 Organisation and culture: 1060]

## Flexibility and managing career breaks

a)

## (i) Maternity return rate

Over the census period, six women took maternity leave ( 2 researchers, a lecturer, a senior university teacher and 2 clerical and secretarial staff members), and all have returned to work. These numbers are very similar to the previous period (five women, with the return rate also 100\%), showing the sustained positive attitude in the Department. All academics concerned returned to part-time employment, with the opportunity to go back to full-time in the future. This contractual opportunity to return to full-time work was negotiated by the HoD over a decade ago for all female academics in Chemistry who wish to have a period of part-time working after parental leave.
(ii) Paternity, adoption and parental leave uptake

Over the census period, three men have taken paternity leave (a researcher, a technician and a management and professional staff member), again similar to the previous census period (four men). To promote the uptake of paternity leave, relevant information was included in the E\&D update sent by the head of the E\&D committee to all staff and is also available through the Departmental E\&D page.
(iii) Numbers of applications and success rates for flexible working by gender and grade

All applications for flexible working over the census period were successful, including both men ( 2 in 2011 and 1 in 2013) and women ( 3 in 2011, 3 in 2012 and 2 in 2013). Notably, this involves staff in a range of different roles including 3 researchers, 2 academics, 3 technicians, 1 clerical and secretarial, and 1 management and professional staff member. For academics "flexible" working is also accommodated informally, so these numbers are underestimates.
b)
(i) Flexible working

Flexible working is an integral part of our culture. In our staff survey, 91\% of staff agreed they could approach their line manager to talk openly about flexible working
if they needed to ( $+5 \%$ compared with the rest of TUoS). Both male and female staff use this flexibility to balance the demands of work and family. Effectively $100 \%$ of academic staff are flexible workers who are able to organise their time and work/life balance. To support informal flexible working, teaching duties are scheduled around school drop-off/pick-up times where possible, and departmental meetings are held during the core hours.

TUoS also has specific policies that allow altered working patterns and part-time working to be formally agreed. The department responds to requests under these schemes constructively and these opportunities are used by all staff groups. Currently, 11 staff are formally working flexibly with less than $100 \%$ hours ( 8 female and 3 male): 3 academic staff (all female), 4 clerical and secretarial (all female), 3 technicians ( 2 male, 1 female), 1 researcher (male).

According to the gender survey, $73 \%$ of staff agree that their manager is supportive of requests for flexible working but only $55 \%$ of all staff agree that staff who work part-time or flexibly are offered the same career development opportunities as those who work full-time ( $36 \%$ don't know). However, $100 \%$ of staff who work parttime or flexibly think they are given the same career development opportunities, so the response from the 'all staff' group seems to be a genuine "don't know" response.

Female academics take advantage of part-time contracts on return from maternity leave with a guarantee of return to $100 \%$ FTE in the future (also see Case Studies). This is an area where Chemistry has led in TUoS, ensuring that our female academics have the right to return to $100 \%$ FTE when they wish. The opportunity of part-time contracts is also used by researchers: both female researchers who returned from maternity leave during the census period used these provisions.
(ii) Cover for maternity and adoption leave and support on return

TUoS has a procedure for formal maternity planning and Keeping in Touch days. A maternity plan is agreed upon by the individual and her line manager 3 months before going on maternity leave. Furthermore, a risk assessment is undertaken for all pregnant workers, with assistance of our safety staff, and reallocation of duties is carried out if the working environment presents a risk to the pregnancy. The department also provides facilities for breastfeeding/expression as required.

Female academic researchers preparing to take maternity leave are strongly encouraged and supported to apply to Women Academic Returners Programme (WARP). This is an award-winning TUoS scheme, open to T\&R staff and IRFs, that provides funding for research staff costs while the female academic is away from work, or to kick-start research on return to work, by providing reduced teaching loads or conference attendance costs. Two staff members have benefitted from this scheme during the census period, and two others previously. Furthermore a senior university teacher not eligible for WARP received funding from the Department to sustain scholarship activity.

Following recent changes to paternity leave legislation, our Department raised the issue of a male equivalent to WARP with HR. This proposal is currently under consideration by HR, awaiting information on the uptake of paternity leave and expected costs. More men taking parental leave would be transformational if childcare ceased to be perceived as a female-only issue.

More widely, the Parents@TUOS Network, open to both female and male staff, holds quarterly events and runs a Parent to Parent buddying system for staff preand post-maternity leave. Two of our female staff are involved in the buddy network.
[Word count for section 4 Flexibility and managing career breaks: 848]
[Total Word count for section 4: 4968]

## 5. Any other comments: maximum $\mathbf{5 0 0}$ words

Please comment here on any other elements which are relevant to the application, e.g. other STEMM-specific initiatives of special interest that have not been covered in the previous sections. Include any other relevant data (e.g. results from staff surveys), provide a commentary on it and indicate how it is planned to address any gender disparities identified.

## Highlights:

- Increased female representation at PGR (23\% to 43\%), PDRA (20\% to 36\%), Professorial (0\% to 14\%) levels.
- Excellent support for career development of PDRAs and PGRs, including thriving CRS and award-winning "Think Ahead".
- Positive effect of increased female GTAs as role models for undergraduates.
- $100 \%$ PDRAs encouraged to take-up career development opportunities.
- All eligible staff considered for promotion (do not explicitly apply).
- Improved female staff progression to senior levels.
- Value placed on well-rounded "Sheffield Academics".
- Large improvement in uptake of SRDS by researchers (14\% to 86\%).
- Strong support for flexible working.
- $100 \%$ return rate from maternity leave.
- WARP supports female T\&R academics who take maternity leave.


## Things we need to work on:

- More females applying for academic positions [Action 2b.1-5].
- More females applying for PhD positions [Action 2a. 4 \& 5].
- More females applying for researcher positions [Action 2b.6].
- Improved monitoring of academic appointment from application to post [Action 1.4].
- Continuing to raise awareness of development/mentoring opportunities to staff and students [Action 3.2 \& 3].
- Sustaining support for our Researchers Society [Action 3.8].
- Increased visibility of female role models [Action 2a.1,2,4, 4.1, 5.8, 5.10].
- Sustainable and practical WAM that reflects our values [Action 5.3].
- Grow new staff induction materials and intranet [Action 3.5 \& 5.1].


## New Initiatives: Narrative goals

The Department of Chemistry is taking part in the pilot of an initiative to develop narrative goals for diversity and inclusion within workforce. The scheme aims to develop and support the attainment of achievable three-year goals for which the HoD will be accountable. Targets are based on assessments of diversity deficits or imbalances in existing staff including the numbers from under-represented backgrounds who have the potential for progression, and recruitment from under-represented groups. Ways of working that can be diversified will also be identified. The process leading towards setting our goals is currently in progress.

## Outlook

Analysing our data and surveys has been insightful, at times challenging, and at others a cause for celebration. With strong leadership we have aimed to ensure our Department is a collegiate environment where all staff can thrive and reach their potential. We are now realising the impact of this. Building on decade-long efforts to boost female representation at undergraduate level and support for staff career progression, since formerly beginning the AS process we have also devoted effort towards our pipeline staff (PDRAs, new academics) and PGR students. We have improved representation of females at post-graduate and researcher levels and invested in supporting these groups. Moreover, these efforts have involved raising awareness of AS activities and ambitions among staff and students at all levels, from undergraduates to professors. Even so, we still have much work to do. Looking forward, we need to build on and sustain recent successes. As the department enters a period of increased staff recruitment we need to ensure our mentoring and induction provision is always first rate. We need to increase the numbers of females applying for positions at all levels. We look forward to continuing this process with our action plan.
[Word count section 5: 500]

## 6. Action plan

Provide an action plan as an appendix.
The plan should cover current initiatives and your aspirations for the next three years.

## 7. Case study: impacting on individuals: maximum 1000 words

Describe how the department's SWAN activities have benefitted two individuals (one from the SAT, one other member of staff) working in the department.

## Case Study 1. Natalia Martsinovich (on self-assessment team)

I joined the Department as a lecturer in Theoretical Chemistry in 2013. I found the Department very friendly and welcoming, and senior colleagues were happy to answer my questions on how teaching and various support services work here. I much appreciated meeting the colleagues informally over coffee in the common room. I also received start-up funding to purchase equipment and for conference travel, and funding for a PhD student.

My first child was born the following year, in May 2014. My colleagues and the senior departmental management were very supportive, and I received advice from both female and male colleagues, as well as attended University-run "Parents at TUOS" meetings. As my baby was due before the end of the academic year, the teaching schedule was rearranged so that my lecture course finished 2 months before I went on maternity leave, allowing me time to prepare for leave. Risk assessments resulted in a reallocation of laboratory teaching responsibilities; this was not necessary for my research, which is entirely computational.

The HoD suggested that I apply for WARP, a Sheffield scheme that provides up to $£ 10,000$ funding for women academics returning from maternity leave. This funding is flexible, and I decided to request $£ 9000$ for teaching cover and $£ 1000$ for conference travel. This arrangement gave me, as a young academic, an opportunity to focus on research and work towards building a scientific reputation. Before my leave started, I discussed my teaching schedule for the next year with the HoD and the Head of Physical Chemistry section. My teaching hours were reduced, to reflect a part-time working arrangement and the contribution from WARP, and I had a choice over which courses to keep.

After 5 months on leave, I returned in October 2014 to work part-time ( $80 \%$ FTE) with the option to return to full-time later. My lecture courses were scheduled for the second semester; this allowed me to get up to speed with work gradually. In the first semester I was also able to work from home one day a week, by arrangement with the HoD. During this time I prepared and submitted a grant application to EPSRC. My first PhD student (funded as a part of my start-up package) started in December 2014. Using the WARP travel funding, I was able to invite a collaborator to discuss future research plans, and attended the RSC Materials Chemistry conference in summer 2015. Thanks to the time available to spend on research, I submitted 3 papers this year.

This year, I decided to return back to full-time work. My teaching load is now similar to my first year (a probationary load). I use informal flexible working arrangements: for example, I can leave early and catch up on work in the evenings. The length of my probation was extended to include the time when I was away on leave. I am convinced that I was not disadvantaged by taking maternity leave and the period of part-time work. I am very happy to work at Sheffield, both as a scientist and as a young parent.
[Word count 509]

## Case Study 2. Elizabeth Baggaley (Researcher)

I joined the Department in 2004 as an undergraduate student. After graduating in 2008 (finishing top in my year) and experiencing working in industry during my undergraduate degree, I decided
to pursue a PhD. I studied for my PhD in Sheffield under the supervision of Dr Julia Weinstein, who was, and continues to be, a supportive mentor who helped me to build networks and encouraged me to attend many conferences.

In 2011 I became a member of the research staff in the department working with Julia and then with Professor Mike Ward. Like Julia, Mike is a very supportive line-manager. He has facilitated my career to develop to my current more senior research and teaching role as Mike recently began a 4 year tenure as Head of Department. My new role (contracted until December 2018) involves managing Mike's research group, as well as undergraduate teaching. During this time I have participated in and benefitted from a number of courses run by the University, such as a Grant and fellowship writing course, CiLT, Think Ahead, SURE (as a project supervisor initially and a review panel member the following year) and mentoring. I also serve as a member of the Faculty Researcher Development Group that helps develop and identify needs and development opportunities for our research staff.

With the help of colleagues and support from the Department I set-up and was the inaugural Chair of the CRS. The CRS facilitates personal and professional development for researchers, acts as a collective voice and provides a forum for networking and collaboration. Two years on, the CRS is thriving and people are keen to use it as a forum for discussion and feedback. As well as supporting staff to make the transition to a permanent academic post the CRS also encourages staff to think about what they are trying to achieve in their postdoc, and provides information about alternative employment opportunities. I was also involved in piloting the new SRDS form for post-doctoral research staff to help facilitate career planning discussions with line managers.

The department as a whole has a good productive culture where research staff are trusted (with no probationary period, unlike some universities). My line managers have been really supportive allowing me to develop my own research independence and flexible working patterns. For example, I recently applied to the Science and Technology Facilities Council, Oxford, for time to perform experiments at their facility as PI, following my own research interests.

The sector-wide culture and funding structure for post-doctoral researchers is one of insecurity and short-term contracts (which is particularly unattractive for women at this point in their lives). While this is a national (if not a global) problem that we alone cannot solve, I am pleased to work in a University and department that are engaged with trying to make these conditions better, and support the development of research staff.
[Word count case studies: 478]
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 GTA posts were particularly encouraged. The consideration of PhD study. Female applicants to
 deadlines were revised. Letters were also sent to al
 ənss! ue əq ol səכejd aपd Iof suol! eo! jdde fo
 brochures have been redesigned to attract females. in recruitment materials. Departmental webpages \&
 $40 \%$. to $43 \%$ (6 of 14 GTA) demonstrating) rose from 0\% women (of 11 GTA) Importantly, GTA PhD students (highly visible to
 and 20 to $\mathbf{3 6 \%}$ for PD staff. representation from 20 to 23\% for academic staff 6 female PDRA staff, increasing the female new female lecturer, a female senior lecturer and

this Departmentally and at a University level this Departme tally and at a University level addressed Implementation
(uolss!̣uqns łseן oł әłеןə』 sıəqunN)

since

|  <br>  <br>  Ife łe әэ！ <br>  <br>  <br>  <br>  <br>  <br>  <br>  |  <br>  ＇әл！mou s！pue pəuб！səp uәəq seч әбедqәм <br>  <br>  <br>  <br>  <br>  <br> $\forall$＇рәбиечэ pue pəssəsse seм d！чsıəquәu $008 \exists$ |  －әว！ฺэeน <br>  <br> 208ヨ <br>  ＇әәи！ |
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|  <br>  <br>  <br>  u！pue＇sıәриә6 чłоq эо サеts | 6uıo反uo－ 91／L／L әગe｜d u！mətsर今s | $008 \exists$ <br> pue әэыно пон | иәуеұ иәәа <br>  <br>  <br>  дәриәб әдәм suo！̣еu！̣on －әqе！！еле еұер ұиәииэ |  <br>  <br>  | $\varepsilon^{\prime} \downarrow$ |
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| səsınoo ano ıəəfe pue <br>  pue бu！̣еןəлоэ Кq ләриәб uo peseq de6 łuәسu！elpe ue <br>  | 6uob иәपł 9l／8／L亿q әэゃן и！шәұsイs | ООヌヨ Кq иәәsıәло еұер әұепрелб <br>  suo！ss！upe on | －Кеміәрип Креәдје <br>  <br>  рәрпןои！pue pәsКןеие Креәдје s！eұер ио！̣ео！！！sseן әәлбәд | ләриәб Кq（ sәрелб Кцұшә＇s＾ <br>  | $て ゙ \downarrow$ |
|  <br>  ＇еұер dnox6｜｜әssny ol əıedmos pue ssəıБิодd әјепןелә 아 pəsn әq ueo łeपł słəs <br>  | K｜lenuue <br> buiobuo | 208ヨ pue <br> әэ！ <br>  <br> 150d＇weәt uolssimpe on | ниеңs ol pəpodəл pue sıeәК <br>  <br>  <br>  еұер Ки！̣иешшәл IIV＇sıeәк <br>  |  <br>  <br>  <br>  <br>  | $\cdot 1$ |
|  <br>  <br> 6u！nol！uow pue u |  |  |  |  |  |
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| ssəoэns 〕0 əınseəw | 6u！w！ | K！！！！q！suodsəy | sso．60．d | uO！ |  |


|  suo！̣эe pue səmoэŋno $\varepsilon$ sイəュıns әрім <br>  ised ol uosuedmoo pue ełep <br>  <br> －Кәлıns ןe！uuə！ әцł и！sәұел ио！̣эеце！！еs pue uo！ped！！̣ued 46！$\cdot$＇$\llcorner$ | 6uı̣обuo |  ＇वон＇б•ə дәбеиеш әъе！udoıdde moщ әsuodsəд＋ $008 \exists$ | suo！̣eo！！dde S甘 juənbəsqns <br>  6и！ицәэиоэ еґер 6и！̣иодәл <br>  иәуеъ әф Кә૫ъ se sənss！ <br>  s！чł pue pəssəuppe 6u！əq әех <br>  рие sәшоэұпо рәңет！иишшоэ pue słfnsaд paredmos＇（GLOZ 8 ع10Z）sイəл．ns дәриә6 กэヨ неңь омұ рәшиодәд әлеч әМ |  ןenp！！！̣pu！̣ se）әұe！̣doıdde se 反u！̣！ue sənss！ <br>  아 pue sıeə久 ssoxoe әגedmoo pue sənss！ $08 \exists$ <br>  <br>  | 9. |
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| әsınoэ до ләџеш е se дәриә6 Kq uмор иәуоля едер IIV | рә！！！！uәр！ иәчм pue sy | 2083 |  ләриә6 әq оł pəəsənbəд uәәq seц Кәлıns uo！̣כə！əə Кер иәdo | дәриәб кq имор иәуолq ејер әлец оұ Кqqоך ләриәб Кq имор иәуодя <br>  | S＊ |
| －（səınpəวoıd 6u！̣s！！ ночs pue 6uo，‘sןe！ <br>  әд sәןешәґ әдум <br>  <br>  ＇łs！！ 反uoן 反u！pnjou！uo！̣eo！｜dde <br>  <br>  słuәułu！odde ॥е дол еұер әчъ <br>  |  |  | ＇рәдер－уэет <br>  <br>  <br>  <br>  әчł дәло рие sшәłsイs иәәмłәд рәуи！！s！eұер моч ło sənss！ yH pue SכIつ of yoeq－pə＿ |  <br>  <br>  <br>  <br>  <br>  <br>  <br>  <br>  <br>  <br>  <br>  snsuәэ дәs е чџ！м s！！seq ןenuue ue иo рәłепол <br>  s！ssəooıd ұuәшұu！ łечł имочs sey ełep to uо！！enjeлә sno！ләлd <br> ＇yels $10 \ldots$ ssəooad uo！ <br>  |  |


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| pәı！пbəı se <br>  |  | ¢H | uols！̣ィoud ұuәano u！sde6 u！ו！！ ә૫ъ и！р рәч иәәq К1ұиәәә」 әлец suolssəs әyodsәq pue <br>  <br>  Hets yH Kq pez！ue6ıo 6u！̣ә s！бu！u！ét seiq sno！osuooun |  <br>  | て＇Z |
| К｜｜еидәхә <br> әр！！！！＾К Киеәә s！иәшом <br>  <br>  <br>  <br>  | 6u！̣oбuo | дәұsemqәм pue $098 \exists$ | －әл！！mou <br> s！pue д！！nq uәəq seч ә！！sqәм |  <br>  <br>  <br>  <br>  рәңеэ！рәр е и！еңи！еш рие молб＇dоןәләа | l＇z |
|  （ұиәшц！！лэәл）ио！ұеłиә |  |  |  |  |  |
| Ked ләриәб Кие ґо ґиәшіssəsse ә曰qеиә он ләриәб кq имор иәуоля еңер Кıејеs и！̣едао | 9102 100 |  | еұер s！чұ бu！̣иodәд uo suo！ssnos！p pәłe！！！u！ |  <br>  <br>  | 8＇L |
| uo！ss！uqns $N \forall M S$ <br>  ssəooud pue pəssəıppe suoissimo＇Kil｜enuue pəssəsse pue әряе！еле еұед | 6uıo6uo | $008 \exists$ | un6әq（еңер łиәш！！！nıəәд <br>  әғер pue（sイәлıns pue stełs <br>  suо！！əәәюоэ еұер би！обио | uejd uo！̣oe s！̣ł <br>  | L＇L |


| ＇səןewə <br> щио৷ suo！ <br>  <br>  | LL／E／L | уH ‘dnoגб би！чиом мәи рие әәә！！uшоэ әл！！nวәхә＇フロ8ヨ |  |  <br>  <br>  | $1 \cdot 9 Z$ |
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| ＇suo！̣еग！！ <br> ио әұедұәәиоэ Кן！еэ！！ |  |  |  |  |  |
|  |  |  |  |  |  |
| （\％0G 아 K｜Inıədoy） <br>  <br>  | 6u！o6uo | щеұ би！чэеә৷ <br> IIV ‘Sとつ ‘sə！pnIS jo sıołoə！！＇aOH | ¡үәшนедәр <br> әપł u！s｜əрош әן૦д әłошолd pue słuəpnłs лeə ${ }_{p \text { рı }} \varepsilon$ łsəq ә૫ł Oł sıəŋə puәs ‘suo！̣eo！！dde <br>  |  | G＇eZ |
|  | $\begin{array}{r} 9 \mathrm{LOZ} \\ \text { ләшuns } \end{array}$ | әәम！шшоэ <br> K！！！！！qnd 8 008ヨ | －әәџ！！umos K！！ पџ！м рәұе！！！u！uo！ssnos！ด |  <br>  <br>  | $\nabla^{\text {＇eZ }}$ |
| sкep uədo Kepınıes u！uo！̣ed！̣！̣ıed pəseəəou！ue IOf щełs Kq dn иәуеұ pue skep uәdo Kepınıes <br>  | LIOZ ıəسuns | KıンsınN <br> ‘uolssimpe 9 ןедұиәэ ‘รәэ！ฺләs孔uәpnłs ‘フロ8ヨ <br>  <br>  | ＇sıәрןоч әуеұs <br> ұиеләәə pue ОО8ヨ І0 ג！̣ечэ นәəмıәq рәғе！！！！u！uo！ssnכs！ด | sאepınıеs <br>  <br>  <br> Kq sKep uədo Kepınıes uo sə！！！！！q！suodsəı <br>  | \＆＇eZ |
| sכ！шәреэe әןешәృ ıо！uəs Кq uәл！̣б sКер uədo <br>  <br>  | 6u！̣6uo | pue әәџ！யшоэ suo！ss！up $\forall$ |  <br>  әınsuә I！М шеәң иo！ss！up $\forall$ |  <br>  <br>  | $\mathbf{Z}^{\prime} \mathrm{C}$ |
| ＇pəseәдכu！ <br> sәןешәృ шоц suo！！еэ！！！dde <br>  әде sןəрош әןод әןшшә」 |  | әәџ！！uшшоэ K！！！！｜qnd pue 11 ＇008ヨ | дəłsewqəм ə૫ł se ॥əм <br>  <br>  рәлə！чગе иәәq seц s！ч」 |  <br>  | L＇eZ |


| ＇peədde ano әseәəวu！ pue uịelu！em of uo！̣emiofu！ s！чł әsn ؛słueo！！dde <br>  <br>  sеч ұечм јо әэиәр！лә цınow－ло－рıом и！е̨৭о | LL／8／L | SYO＇008ヨ | ＇łəs әғер е pue łu6nos əq ol pəәu słued！̣！иед |  <br>  <br>  | 9＇9Z |
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| ¡ґ！ әןшәґ рә！！！епи әдәчм <br>  <br>  <br>  səs！̣ре pue suo！̣eo！！dde əч！ <br>  е Кqәдәчм سs！uечэәш $\forall$ | бu！̣оби | O98ヨ＇00H | ＇us！ueyэәш <br>  <br>  <br>  цБ！ч „о әuou pue＇suo！̣еכ！！dde әןешәょ мәృ 00子 Әдәм <br>  e IOł suo！̣eo！！dde əчł pəssəsse <br>  |  <br>  <br>  <br>  <br>  <br>  <br>  <br>  | S＇9Z |
|  سоц suo！ <br>  әюшәґ леןnэ！ұлed u！pue＇щеңs <br> ॥е әәәцм ‘әэ！ <br>  ¡еч әјеме s！К！！unwшоう | 6u！o6uo | yd pue <br> słuәpnłs＇yełs IIV |  <br>  | Кןеиопұеи sуломұәи <br>  <br>  | $\nabla^{\prime 9} \mathbf{q}$ |
| sdnoג6 <br>  шол suo！̣eכ！！dde әıоW | $\begin{array}{r} \hline \text { Ku!̣ol!uou } \\ \text { spəәu } \\ \text { 'əuō } \\ \hline \end{array}$ |  ‘ロон ‘008ヨ | sұәлре ॥е u！pәрпрэu！s！ pue рәр！эәр иәәq sey би！̣ıом |  <br>  <br>  | $\varepsilon \cdot 9 Z$ |
| sәןешәд рәృиәןе moı suo！̣eכ！！dde əıоW | 6u！̣o6uo | みе <br> ॥е оұ әјет！ <br> 아 OOH | －ssəฝ6o』d u！I！！！ s！̣אןeue ןn！łnq suo！̣eo！！dde Ł0 」əqunu u！əseəəวu！ <br>  <br>  Ot Hełs pə6eınoouә pue słsod мәu 乙 рәs！！ıəлре Кןұиәәәу | Kıdde of słueo！！dde <br>  әле słsod иәчм K！！unшшоэ э！шәреэе <br>  | $z \cdot 9 Z$ |


| ənss！૫ગ૨ә ィ0〕 ə｜q！suodsə» <br>  <br>  <br>  <br>  | ındu！ <br> 6uịo6uo ‘91／レ／L әұәృdسоう |  |  | －Kןədod suolido <br> ןеuo！̣omoıd pue ұиәшdоןәләр әұепןелә pue <br>  <br>  <br>  <br>  | $\mathrm{S}^{\prime} \mathrm{E}$ |
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| ＇צэедрәәן әк！！！！！sod pue бu！̣әәш яо әэиериәџие \％001 | Kıenuer и！Киеәл | $\begin{array}{r} \text { peәH } \\ \text { ıəұsnio pue gOH } \end{array}$ | Kıenuer <br> u！ssəooad ןenuue ue Креәдן | ＇реәч ләұsnј чэлеәsәл <br>  <br>  | $\nabla^{\prime \prime} \varepsilon$ |
| －Kəлıns みełs <br> Kq әsn лоұ！uow＊Кןбu！pıoээe Kıdde ло рә̨еu！̣ои әле pue sə！！！unııoddo łuәшdoןəләр цวns ґо әцеме әле щеłs IIV | 910乙 əun「 | sдәмәıләл SOYS ‘008ヨ |  <br>  uo łnd əq II！M əoınosə SQYS －sə！！！unuıoddo ұuәudoןəләр әsəцł рәs！̣əəре seч つロヌヨ |  | $\varepsilon^{\prime} \varepsilon$ |
| ＇Injəsn ssəooud ə૫ł punoł <br>  <br>  <br>  | Kjne и！Киеәл | SOn」（DuәшоM <br> ‘sıәмə！ләд <br> SOZS ‘dOH | ＇əq！ssod se｜njəsn se ssəכoıd SUYS әцł әуеш <br>  <br>  <br>  әбрәןмоия иo s！seчdшә ч！！̣ sıәмә！ィәд ןе дод би！̣и！ед pue 6u！fouq uo！̣eqoıd pue says |  <br>  <br>  <br>  <br>  <br>  uo！̣eqoıd／Says əןqenje＾e әp！＾oıd of ənu！̣uoう | て＇E |
| рәц！！nbәл <br>  | LI／Z | ¢H | ＇yH Kq рәz！uебıо <br>  <br> s！ఢџ әиор әлец sıәquәш <br>  |  suo！̣omodd „е גо бu！u！eג se！q sno！osuooun | L＇E |
| ұuәudоןəләр ґо әуеґdn Кq | eэ！！！כəds | әлеэ puе ןе！ұиәן |  य！әчł Кu！doןəләр Кq неұs әן | o sлә！ллеq ou әле әләцұ 6u！̣nsuә pue sә！！！un <br>  |  |


| әınł!nว <br> ןеұиәшдедәр әчł „о цед ןелБәృи! ие рәләр!suoo Кןиәdo s! Бu!yдом ә\|q!хә|ப pue әлеә| (Кұииәәед рәриәұхә мәи әцң <br>  | 6u!̣o6uo | 2083 |  yu!! pue әлпңелә!!! ‘әu!!ze6eш <br>  sби!̣әәш щеъs оұи! әұедБәци | sұиәшәбиение <br>  <br>  <br>  | - |
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| s母yad <br> шо» Кəл..ns ә૫ł u! əsuodsə» әл!!!!isod pue uo!ssəృodd ә૫ł u! sis! <br>  | 6uıo6u\% |  | - Suļ̣ediọned pue 6u!̣_ э!шәреэе әлоW 'Ки!и!ич s! pue <br>  |  dof әэ!o^ e se sloe pue sad pue syod <br>  <br>  <br>  | 8' $¢$ |
| ұиәшщедәр <br>  <br>  | K\||enuu* | paued suonomodd <br> ' yH ' $\mathrm{\sigma}$ о |  <br> е sey мои 'әреш ॥е sем paued suo!̣omodd 's!seq s! uo uollowoud dof К\|dde of Hels <br>  К\|ןеnuие Креәле ұиәшұедәа | әכuеןeq <br>  әңł иo ио!̣еұиәsәддәл әјешә! sКемןе s! <br>  <br>  <br>  <br>  <br>  | L' $\mathcal{L}$ |
| - реорулом ио ұэәдә әл!̣ебәи ou цџ!мм sə!!!unıuoddo ұuәшdoןəләр <br>  | GLOZ ^ON | OOH | 'W $\forall M$ <br>  uо!!ed!!!̣ие ләреәך pןə! <br> үодә <br>  <br> әреш әq 이 spәәu $W \forall M$ әЧł дәләмоч ‘рәмә!лә би!əq <br>  | łuәшdoןəләр <br>  <br>  <br>  | $9 \cdot \varepsilon$ |


|  <br>  |  |  |  |  |  |
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| əınł｜${ }^{\text {¢ }}$＇ 9 |  |  |  |  |  |
| Hełs әu！l－ued Kq sə！！！uunuoddo ¡uәшdoןəләр ґо әуеұdn әдоW | 9L／G／L | 008ヨ ‘00Н |  <br>  <br>  | （WVM ә૫ł U！pəpn｜ગu！ <br>  <br>  <br>  ло әш！！－дед би！члом ұецұ ssәиәлеме әsеәлии | S＇t |
| SOก」 Кq рәәәно みoddns <br>  әлеме рие рәјәия әле деня II甘 | 9 $/$／$/ \mathrm{L}$ | 6u！̧ə！ıq yH | əәueдии サеłs әપł оłu！yu！！pue әınıедә！！！ ןеłиәшれеdәр u！əs！̣！｜qnd pue <br>  | son（0）stuәred se <br>  ‘әбеуэед Кұииәәед рәлолдш！мәи рие Ки！иәәеш <br>  | ガも |
| －әq！ssod әләчм słsənbәд uдәџед Би！ңлом <br>  ssəวoıd 6u！｜qеңәш！！पłoous | 91／0L／L |  ＇оон ‘әәд！шшоэ диәшәбъиек | －6u！｜qеңәш！！ әәојәq uо！̣еңן <br>  s！ұечł шs！иичэәш doןәләа －әq！！ssod әдәчм sısənbəд ןе <br>  <br>  <br>  <br>  иет рие әпрәчэs иен е ио <br>  | －əq！ssod ！！ әsәчł әұерошшоээe ot 6u！̣u！e＇sə！！！！！q！suodsə <br>  <br>  <br>  | ع＇t |
| әряемим <br> pue рәлоиоч әде suәəted <br>  | LL／OL／L | वон＇әән！шшоэ ¡иәшәбеиеW |  әq pınom әэeןd u！əде <br>  әגnsuә ol s！！$\ddagger$ Бu！pıoכəд <br>  ＇јо әдеме s！वон әчł цэ！чм suıәŋеd би！члом әү૧！хәן ןешлоృи！әлеч деңs Kuew | ＇ssəэoıd <br>  и！би！ <br>  <br>  | でも |


|  <br>  <br>  pue łuәшұедәр әцł и！！！！мм ןе！！uәnןfu！әле sәןешәן <br>  | 6u！o6uo | OOH | －К｜ןеnuие мә！ләу <br>  әq II！М рие рәңэпısuoo иәәq <br>  | d！̣sıәqшәш әәџ！ишшол <br>  | 9＇S |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  щеłs pəouejeq pue әsıәл！р ‘jenbə әıou e of 6u！peə sə！！！！enb „ełs fo słつədse <br>  Ł0 6u！puełsıəpun „еłS | 6102100 |  | 910z иег и！Кер Кеме ие <br>  <br>  <br>  |  <br>  <br>  <br>  | S＇S |
| of dn s！！$\ddagger$ dәәу of əכeןd u！s！ سs！̣иецวәш e pue ‘ə！！！ uo łuәsəıd bu！̣q ןе шәчł Чł！м <br>  | 91／L／L | дəృsewqәМ ‘əગ！ృ૦ әл！̣едs！u！up pue 」əбeuew＇łdəด | s！̣ł op <br>  | s！！ełəә łכełuoo પł！м <br>  <br>  | $\nabla^{\prime} \mathrm{S}$ |
| Kddey әле＇ $41!M$ ＇Kןenuue ұuәшәןdu！of Kiseə s！‘Кןңłоows sunג ұечł WVM $\forall$ | L／910Z | －реә <br> บH ןełuәسдие ＇ロOH＇孔еłs IIV |  еұер лој sрочłәш әлолdш！ оł sıәdоןәләр әдемџоs पұ！м <br>  <br>  <br>  <br>  |  <br>  <br>  łsə66ns of Кt！unдıoddo ue әлеч pue syset 아 pəu6！sse uәәq әлеч sf！！גeł MOч puełsıәрun <br>  | $\varepsilon \cdot \mathrm{S}$ |
|  <br> ＇słuәpnłs чכцеәsә» pue みеұs <br>  <br>  pue ұиәшdoןəләр ‘sə！！！！od So әле みеৃя э！шәреэе мәu IIV | 9レ0Z／ヶ／レイタ |  |  <br>  <br>  | －sə！！！unłıoddo ұuәudoןəләр <br>  <br>  <br>  | Z＇S |
| －əィ！̣эnpoıd <br> әшоэәq Кןуэ！̣nb ueэ pue＇səןoג ג！ןŋł puełsıəpun ＇рәшоэәм әце щеңs мәи IIナ |  |  ‘дәбеиеш әи！！‘वон | рәғеןnuxos <br> uəəq sey us！！ueyวəu uo！̣эnpu！ u＊サels $\forall y 口 d$ pue so！məpeoe <br>  рә！！！！uәр！dnoג6 чs！u！！pue yse」 |  <br>  <br>  мәи ұхәи ano uo ssəכoıd uo！̣эnpu！ue әృฺ！！！u｜ | $1 \cdot \mathrm{~S}$ |




| ¡ұәлә ио！！едqәəəว <br> N $\forall M S$ euәчł $\forall$ ue әлен <br>  ұuełıodu！ue әq ot sənu！̣uos <br>  | 6uı̣o6uo |  | sбu！̣əәш әә！！！uшоง ұиәшәбкеиеш pue Би！！əәш неңs ио шә！！ериәбе би！puełs |  uo！̣omod pue ә！！oud әપł әseəдวu！of ənu！̣uoう | U＇S |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  <br>  ueo uanł u！pue səssəoons <br>  pue до әдеме әле деңs II甘 | 6u！obuo | s．əquam みels IIV pue aOH ＇sıəəsnio чэлеәsәу јо sреән |  ә૫ł uo łnd әq oł дәəsemqәМ <br>  <br>  | ＇sıouoч pue sрлеме se yэns sәssәכэns <br>  <br>  | OL＇s |
| ＇әэe．｜d səyet <br> ¡иәлә ןе！̣os әл！̣snןગu！ןenuu甘 | K｜｜enuu＊ | （みеңs әృе！udoudde 아 рәңебәәәр）वон |  | s！seq jenuue ue <br>  | 6＇s |
|  <br>  <br>  | 6uıoбuo |  | sıәуеәds <br>  s！чł deł os＇suo！！sen6ns dnoa6 <br>  <br>  <br>  <br>  бu！̣sənbəд ！！ешә әчュ | ＇иәшом <br>  <br>  <br>  | 8＇S |
| ‘səן૦ әэuеuдәлоб ／d！̣sıəреә <br>  әןешә ґо sıәqunu pəseәлии łuәudoןəләр みеłs ןenp！ィ！pu！ <br>  <br>  <br>  рәКоІdәр әле みеґS |  |  |  イq мә！ләд рие ио！̣әәə｜оэ вұер ןешлол е доןәләд＇Кןешхоји！ <br>  <br>  |  <br>  <br>  әчł рлемәл рие ә6елпоэиә ‘мә！ләу | L＇G |

