NERC Doctoral Training Partnerships

Mid-term evaluation

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About CRAC

The Careers Research & Advisory Centre (CRAC) was established and registered as a charity in 1964. We provide research, expertise and innovation services for all those who support career development, at all ages and across all sectors. CRAC’s research, evaluation and consultancy work focuses on career-related learning, employability development and transitions into, within and from higher education, including STEM and researcher careers. CRAC also owns and manages Vitae, a programme of professional, career and personal development for researchers in higher education.

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1. Executive summary

Methodology
An evaluation of NERC’s Doctoral Training Partnership (DTP) scheme has been conducted, at broadly the mid-point of this scheme. The objectives of the evaluation were:

- To monitor the performance to date of individual DTPs against NERC’s success criteria;
- To identify and provide evidence of the success and wider impact of the DTP scheme, to inform NERC’s commissioning of future DTP support and awards.

With input from its Training Advisory Board (TAB), NERC undertook online surveys in spring 2016 with key respondent groups including: the 15 grant-holding organisations or departments leading each NERC DTP; academic partners within the DTPs; non-academic partners in the DTPs; current PhD students within the NERC research remit including those within the DTP schemes; and other stakeholders. Interviews were conducted during visits to the DTPs by members of NERC’s TAB with representatives of each key informant group.

600 responses were received from PhD students who identified themselves as being part of a NERC DTP-funded cohort (437), being trained in association with one of these DTP cohorts (36) or being trained but not within a NERC DTP (127). The 437 responses from current NERC DTP students represent almost two thirds of the 660 participating PhD students in the first two DTP cohorts (which started in 2014 and 2015, respectively). All the 15 DTP lead organisations, 79 academic partners and 55 non-academic partners responded to their respective surveys.

The findings in this report are based on an independent analysis by the Careers Research & Advisory Centre (CRAC) of the information collected in the surveys and interviews.

Overall findings
At this stage of the scheme, overall, the impression gained is that the DTP mechanism is working and providing valuable training to funded PhD students. The evidence suggests that the training being delivered has distinct benefits over that conventionally provided through the ‘algorithm’ mechanism of PhD training.

The 15 DTPs appear to be functioning well and are well-managed in most respects, delivering a wide range of subject-specific and transferable skills training to high-calibre PhD students who will in due course produce high-quality research. There are also signs of improvement in certain aspects of delivery to students in Cohort 2 compared with Cohort 1.

In detail, there are issues in some DTPs around how meaningfully some non-academic (i.e. end-user organisation) partners are engaged. There is scope to improve that area of DTP management, and also for incremental enhancements in consistency of delivery, embedding the DTP model in institutions for sustainability, and enhancing the level of understanding and commitment of both students and academics to the DTP model (especially its potential value to those on all types of career trajectory).
Evaluation findings against the agreed success criteria

Research excellence:
- Overall, the evidence available suggests that all the organisations involved in the DTPs have excellent research environments and researchers, and that the DTP partners themselves are producing excellent research. On this basis it seems reasonable to conclude that the students are being trained within excellent research environments;
- Although it is early in the lifetime of the DTPs, there is already evidence that excellent research is being undertaken with early outputs and perceptions consistent with high-quality research;
- DTPs have been prioritising student excellence during recruitment, although this can mean that they struggle to fill projects in certain areas of their subject remit.

Training excellence:
- Most of the DTP students perceive their supervisory teams to be of high calibre scientifically and are receiving regular supervision at an appropriate frequency;
- Most but not all students participate in a Training Needs Analysis (TNA) – although not all recognise it as such or understand this terminology – but there is some scope for higher participation still and students do want to participate in this way;
- Most students appear to have appropriate control over their own training, and are very positive about the subject-specific and transferable skills training being offered and the perceived benefits for them of participating in such training;
- Induction processes have improved between Cohort 1 and Cohort 2 and are now good;
- Some students expect that support or training in writing for publication and preparing research outputs will come from their supervisor rather than from the DTP, so DTPs should potentially be clearer about their provision of this type of training to their students;
- The majority of students are satisfied with the financial and logistical support that they receive, although some report that their Research Training Support Grant (RTSG) is insufficient where they have specialised fieldwork, laboratory or computing needs;
- Student responses indicate a positive feeling of ‘cohortness’ in terms of perceived integration of students across each DTP cohort and the benefits this brings, including peer support, reduced isolation and broadening of perspectives – this was greatest amongst Cohort 2 students;
- Most students are confident they will gain the skills they need for their chosen career, particularly those in Cohort 2, while end-user organisations particularly highlight needs for communication skills, technical knowledge, numeracy and data skills;
- Relatively few students feel that the training in their DTP is impacting much on their career intentions, with the majority continuing to seek an academic career long-term.

Multidisciplinary training environment:
- Training within a cohort-based or partnership environment was not a major factor when students applied for their PhD;
• Many DTP students are unaware of the key partner organisations in their DTP and a significant minority see little benefit in their involvement (a minority of academic supervisors are also not fully bought into the DTP partnership-based model);
• Students report great benefits from interacting with other students across their own DTP and other cohorts, potentially more than from interacting with other partners such as non-academic organisations. A particular benefit of inter-cohort training is reported to be gaining wider and interdisciplinary perspectives from other students;
• At this stage, few students have spent time with end-user organisation partners but those who have done found it highly beneficial to their project and personal development;
• Other than CASE students, fewer than half of DTP students expect to spend time with an end-user organisation during their PhD and few have a non-academic supervisor;
• Many non-academic partners are strongly engaged with individual DTP students and projects (such as providing supervision of a CASE student, or hosting a placement), whereas at the DTP level only a few are well-engaged (such as helping to provide wider training) and many are not engaged much at all;
• Few non-academic partners are involved in delivering transferable skills training;
• The institutional requirement for 30% of studentships to be CASE projects is challenging, although feedback from CASE students is particularly positive about the benefits of their interactions with the end-user organisation;
• There is no evidence at this stage that any one of the DTP models or partnership structures implemented is more effective than others, or preferred by students.

Excellent students:
• High-calibre students have been recruited but DTP institutions are not yet clear whether to prioritise academic excellence during recruitment or some other combination of attributes and achievements that might constitute the ‘best fit’ for a student to train in a DTP;
• Many DTPs are heavily over-subscribed with applicants for some projects and able to select from many academically strong students, but there are fewer applicants and less competition for some projects, such as in atmospheric or soil science, and especially those requiring high numeracy;
• Not all students understood the DTP model when they were recruited, and some remain unconvinced of the value of all the training opportunities involved as they see some as irrelevant to their research and their expected academic career trajectory. The DTPs have attracted both academically-focused students and those seeking broader training;
• The vast majority of current students would recommend the DTP model to those considering a PhD and cite more benefits than disadvantages, including social interactions, peer and professional support, access to both more and wider training opportunities, and broadening of scientific perspectives;
• Very few of the DTP students are studying part-time, so the extent to which a DTP model can be sufficiently flexible for part-time students needs to be considered, not least because such flexibility generally helps to widen participation in PhD study.
Quality assurance:
• Overall, most DTPs are running well although with somewhat patchy engagement of non-academic partners – some are highly engaged and providing either supervision or training or were hosting placements, but many appear not to be actively engaged;
• There is evidence of good quality assurance procedures around supervision and especially inviting student feedback at many stages of the training programme;
• Students mention the value of support from DTP staff, including administrative staff, as well as the opportunity to interact with high-calibre researchers in partner institutions;
• Perceptions of partnership integration are varied – many non-academic partners are not involved in decision-making and while some are happy with this a minority are not;
• Not all supervisors in the lead organisations or academic partners are fully bought-in to the value of partnership-based training in the DTP model.

Producing success stories:
• This evaluation was conducted before any students completed their PhD programme so could not encompass final outcomes, but there are many positive perceptions and anticipations of success. Clearer measures of what constitutes success, however, and how to assess these against any potential control group, would be useful in the longer term.

Recommendations
• As the DTP model appears to be working, it should continue to be supported by NERC as a PhD training mechanism beyond the lifetime of the current scheme (and the current DTP awards should continue for their planned duration).
• The key elements of the DTP model including embedded transferable skills training and interactions with a range of partners should be continued.
• DTPs should ensure that all students have a TNA and are aware that they have had it, or at the very least have adequate opportunities to discuss their training needs and the opportunities available to them, from the outset of their PhD.
• More overt career training should be provided early in the programme (and offered to any student cohorts that have not yet had such an opportunity).
• DTPs should maximise, within reason, opportunities for students to develop networks of peer support and gain multi-disciplinary perspectives from other students during inter-cohort activities across the range of DTPs.
• The development of brief handbooks for both students and supervisors is recommended to specify and clarify NERC’s expectations of each party and improve consistency.
• DTPs and supervisors should make sure that CASE studentships are meeting the minimum requirements and that students are fully aware of what a CASE studentship involves.
• Development of student-focused case studies and other measures to demonstrate the impact of non-academic partner interactions on success in PhD projects, as well as on career learning for either an academic research or other trajectory, is recommended.
• Improvements are needed to DTPs’ approaches to the interaction with end-user organisations in delivering wider training and improving visibility to end-users.

• DTPs should have a formal mechanism through which to seek external input from end-users (for example an advisory board) into training- and management-related decisions.

• Development of an agreed range of outcome measures for students and alumni, and an appropriate control group of other PhD students, would be valuable in any future assessments of impact (and host institutions should identify in their HESA student record data that a PhD student has been trained in a DTP).
2. Context, evaluation aims and methodology

2.1. Background - UK doctoral training

2.1.1. NERC postgraduate training strategy

The Natural Environment Research Council (NERC) supports training of the postgraduates it funds to ensure that they are equipped with the technical, professional and personal skills to enable them to succeed in their careers, whether they choose to continue in environmental science or not. NERC’s postgraduate training aims to provide a wide range of skills that will be appropriate for a variety of careers, including but not limited to careers in higher education (HE), industry, government or other sectors.

NERC believes that a supply of technically able, skilled and experienced graduates will enable the UK’s increasingly technology- and knowledge-based economy to grow and adapt to the demands and challenges of a changing world. Its postgraduate training aims to ensure that the next generation of leaders in the environmental sector are equipped with these skills and experiences. It currently invests around £25m per year in postgraduate training, supporting nearly 1000 PhD students in universities and research institutes at any one time. During their PhD studentships, NERC encourages its students to undertake training in transferable skills such as communication, project management, media engagement, policy awareness and enterprise, as well as research techniques.

In 2013 NERC announced a new programme of Doctoral Training Partnerships (DTPs), which are the subject of this evaluation, in addition to a new Centres for Doctoral Training (CDT) programme. Alongside these initiatives, NERC offers a wide range of professional and technical skill development opportunities for doctoral and early-career researchers. The aim of offering these courses is to provide NERC-funded researchers with relevant non-academic experiences as well as specialist training in response to identified skills gaps in the UK environmental sector, with the content evolving to match the demands of the end-user community.

Investment in postgraduate training directly supports NERC's strategic vision by developing the next generation of environmental scientists while at the same time helping to form the long-term connections between higher education, business and government that will allow the environmental sector in the UK to continue to flourish and grow.

2.1.2. Postgraduate research degrees

The traditional model for doctoral training was based on the individual student–supervisor relationship, where the doctoral supervisor acted as mentor to the doctoral candidate. In the UK, for several decades, this was supplemented by various extents of informal additional training, normally offered by the HE institution or department in which the candidate was located. The introduction of the Quality Assurance Agency for Higher Education (QAA) Code of Practice for Research Degrees and implementation of Sir Gareth Roberts’ ‘SET for success’ recommendations in 2002 have subsequently transformed UK doctoral education, including two key developments: the establishment of graduate schools and of structured doctoral training.

Most doctoral candidates are now trained in cohorts, to varying extents, and institutions have clear codes of practice on how candidates should be recruited, supervised and trained, and
how their progress should be monitored and examined independently. Since Roberts’ recommendations and the availability of associated funding, institutions have also provided a researcher development programme which is based on the Vitae Researcher Development Statement. Its implementation could be through compulsory, credit-based training programmes and/or informal professional development opportunities, including public engagement activity, placements outside HE and/or placements or internships. The Quality Code encourages the use for each doctoral candidate of a training needs assessment (TNA) and regular reviews to identify specific development needs.

Feedback from candidates forms an important element in the enhancement of doctoral training. The Higher Education Academy’s Postgraduate Research Experience Survey (PRES, introduced in 2007) surveys current doctoral researchers every two years on their experiences of supervision and training. It also enables HE institutions to benchmark their provision against other groups of institutions. All Research Council-funded programmes need to meet the RCUK Statement of Expectations for Postgraduate Training (2015). This requires provision of an appropriate training environment and includes the expectation that the Research Councils will evaluate institutional provision and candidate experiences.

2.1.3. Doctoral Training Partnerships

PhD students funded by the UK Research Councils, and other research funders such as the Wellcome Trust, are now trained through structured doctoral training programmes. The main forms of structured programme funded by the Research Councils are Doctoral Training Partnerships (DTPs) and Centres for Doctoral Training (CDTs). A DTP is a collaboration involving one or more HE institutions or research institutes, collaborating at either training partnership or project level to deliver postgraduate training in areas across NERC’s scientific remit. A CDT, on the other hand, provides postgraduate training that is focused on a particular research area. The delivery of postgraduate training through DTPs and CDTs builds on the growing belief in the value of collaborative doctoral training, i.e. a doctoral degree that involves a research project in collaboration or partnership with organisations outside the HE sector including businesses and policy-makers (often referred to as ‘end-user organisations’).

Structured doctoral training programmes such as DTPs and CDTs include both taught elements and professional development training aimed at enhancing the future employability of the candidate in or outside academic research. The cohort-based nature of the approach also aims to encourage collegiality between doctoral researchers and interdisciplinary working.

In 2013 NERC awarded funding, through a competitive process, to 15 DTPs, which involve 39 HE institutions and 24 Research Organisations. These were designed to provide 240 four-year PhD studentships per annum for five annual cohort intakes, with the first cohort starting in October 2014. Some additional PhD students are also hosted within NERC DTPs, funded by HE institutions, research centres and/or employers. The research within this evaluation focused on the first two cohorts of DTP students, who started in 2014 and 2015 respectively.

NERC has undertaken this mid-term evaluation of its DTP scheme to assess its outcomes and inform future commissioning of DTPs. This report provides an independent overview of the results of that evaluation exercise, together with emerging key findings and recommendations.
2.2. Aims of the evaluation

The principal aim of this exercise was to provide an independent evaluation of the NERC DTP scheme, broadly at its mid-term. Strategically the objectives (developed in consultation with NERC’s Training Advisory Board and the DTPs) were twofold:

- To monitor the performance to date of DTPs against NERC’s success criteria;
- To identify and provide evidence of the impact of the DTP scheme, and inform the commissioning process for NERC’s future DTP awards.

2.2.1. Evidence gathering and approach to analysis

The modus operandi for the evaluation was for NERC, through its Training Advisory Board (TAB), to undertake a series of online surveys and in-depth interviews with DTP participants and stakeholders, obtaining evidence and perspectives from a range of types of participant and stakeholder. Seven online surveys were designed by NERC with the support of TAB and implemented with the following groups during the period April to June 2016:

- The 15 grant-holding organisations or departments leading each NERC DTP;
- Academic partners within the 15 DTPs, which were HE institutions or other research organisations playing an academic role within a DTP (such as hosting a studentship or providing academic co-supervision);
- Non-academic partners in the DTPs, meaning organisations contributing to the DTP in their capacity as end-users of research rather than conducting academic research themselves (i.e. acting as a CASE partner, hosting a placement, providing training or funding or other contributions);
- Advisory Boards for those NERC DTPs that have them;
- Current students studying for a PhD within the NERC research remit including those within the DTP schemes;
- UK HE institutions not currently formally linked with a NERC DTP;
- End-user organisations not currently involved in a NERC DTP.

Interviews were conducted during on-site visits to the DTPs by members of NERC’s TAB supported by NERC staff. The format for each DTP visit was to conduct a series of separate interviews with each of the key groups within the DTP:

1. Lead organisation representatives (including administrative staff);
2. Representatives from academic partners;
3. Representatives from non-academic partners;
4. PhD students.

TAB members assigned to a DTP were provided with a range of evidence including the DTP’s original proposed programme and objectives, assessment panel feedback on that original proposal, any significant changes known to date, annual reporting forms (providing information on cohort numbers, leverage and training activities) and a summary of the survey responses specific to that DTP. Questions during the interviews were related to NERC’s six success criteria (see section 3.1) around which DTP proposals had originally been written,
but individualised to the DTP based on the evidence provided. The outputs from these interviews will supplement NERC’s ongoing performance monitoring work of the 15 DTPs through their annual reporting.

CRAC’s role in the evaluation has been to analyse the survey response data and to extract and draw together findings from these data and the visit reports, and in doing so introduce an element of independence to the evaluation exercise, as well as highlighting issues which could be shared in order to inform development of best practice.
3. Nature of evaluation evidence

3.1. Presentation structure and success criteria

Results from the participant and stakeholder surveys and in-depth interviews are presented in this section. After consideration of the extent and potential representativeness of the information obtained, the structure of presentation of the results follows the six priority training success criteria that have been identified and utilised by NERC:

- **Research excellence**: do the training, and training environments, incorporate scientifically excellent and original research within NERC’s remit?
- **Training excellence**: are the PhD students managed as a cohesive group and acquiring both research and transferable skills? A strong and active community of students should be able, and encouraged, to integrate, work and learn together;
- **Multidisciplinary training environment**: is the training embedded in multidisciplinary training environments, which enrich the student experience and encourage knowledge-sharing and interconnectivity, for the benefit of research within the environmental sciences?
- **Excellent students**: are the DTPs attracting the right students, in terms of the right or ‘best-fit’ students – individuals whose previous training, experience and skills best suit the type of training being undertaken?
- **Quality assurance**: are mechanisms in place, ahead of allocation and delivery of training, to assure NERC that providers will deliver excellent training in line with the agreed success criteria, with outcomes that could be evaluated? DTP operational management will be considered under this criterion;
- **Produce success stories**: is the training producing tangible outcomes and impacts in the broadest sense?

3.2. Range and representativeness of respondents and information

The number of responses obtained to each of the surveys is shown in Table 1. Responses to the lead organisation survey were received from all 15 of the DTPs. The 79 responses from DTP academic partners represented the majority of the partners named in the original proposals and named on DTPs’ websites.

It is less certain how well the 55 responses from non-academic partners represent the views of all non-academic partners linked with DTPs. A total of nearly 350 organisations are listed on DTP websites as active or potential non-academic partners, but it was not possible as part of the evaluation process to establish the level of active engagement of each of these organisations. It is likely that those responding to the survey will have been amongst the more engaged of these non-academic partners.

Not all DTPs had advisory boards, which contributed to only a very small number of responses being received to a survey for DTP advisory boards, and this was also the case for survey versions for HE institutions and end-user organisations not associated with the

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1 These definitions have been paraphrased here as research themes, to aid clarity in this report
NERC DTPs. Collectively these provided a very limited amount of information from those sources.

600 responses were received from PhD students who identified themselves as being part of a NERC DTP-funded cohort (437), or being trained in association with one of the DTP cohorts (36) or being trained within NERC’s scientific remit but not within a NERC DTP (127). These responses provide much of the data presented in this chapter, supported by information from responses to the other surveys. Most of the analyses presented combine the responses from the 437 DTP students and 36 others also trained within the DTP cohorts, and some comparisons are made with responses from other PhD students (i.e. ‘non-DTP’ students).

Institutional reporting shows that in total 330 PhD students were funded in each of DTP Cohorts 1 and 2, so the response rate from these students was high at almost two thirds (i.e. 437 from 660). This response rate and the size of the DTP samples and populations concerned lead to calculated confidence intervals (effectively the margin of error) in results of 2-4%, for a confidence level of 95%. In lay terms, this means that we can be 95% certain that results for different DTP cohorts (for example) that differ by more than 2-4% are potentially significant in statistical terms.

Table 1. Survey response numbers

<table>
<thead>
<tr>
<th>Survey target</th>
<th>No. of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTP lead organisations</td>
<td>15</td>
</tr>
<tr>
<td>DTP academic partners</td>
<td>79</td>
</tr>
<tr>
<td>DTP non-academic partners</td>
<td>55</td>
</tr>
<tr>
<td>DTP advisory boards</td>
<td>3</td>
</tr>
<tr>
<td>PhD students</td>
<td>600</td>
</tr>
<tr>
<td>Other UK HE institutions</td>
<td>9</td>
</tr>
<tr>
<td>Other end-user organisations</td>
<td>1</td>
</tr>
</tbody>
</table>

The key personal and study characteristics of the student respondents are summarised in Table 2. There was exact gender parity within the DTP students who stated their gender identity, but a slightly higher proportion of males amongst the other PhD students. The ‘non-DTP’ students were more diverse than the DTP students in terms of their domicile and age, and year of registration. The proportion of DTP students studying part-time was very low at under 1%, while the proportion amongst non-DTP students was higher at 8% (although this is still low compared with the proportion amongst all doctoral students across all disciplines, which is typically around 26%).

There were between 13 and 45 respondents from each of the 15 NERC DTPs, and within each DTP some respondents from both of the first two NERC DTP cohorts. Overall,
respondents to the DTP student survey were split roughly evenly between these two NERC DTP cohorts. 197 reported they were in Cohort 1, which started in 2014, and 214 in Cohort 2 which started in 2015. The non-DTP respondents, in contrast, had a much wider range of registration years, with only 34% starting in academic years 2014 or 2015.

Table 2. Characteristics of student respondents

<table>
<thead>
<tr>
<th></th>
<th>DTP students (N=460)</th>
<th>Non-DTP students (N=127)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>50.0%</td>
<td>48.8%</td>
</tr>
<tr>
<td>Male</td>
<td>50.0%</td>
<td>51.2%</td>
</tr>
<tr>
<td>UK domicile</td>
<td>83.1%</td>
<td>61.0%</td>
</tr>
<tr>
<td>EU domicile</td>
<td>14.9%</td>
<td>13.8%</td>
</tr>
<tr>
<td>RoW domicile</td>
<td>1.9%</td>
<td>25.2%</td>
</tr>
<tr>
<td>Aged 20-29 years</td>
<td>82.1%</td>
<td>52.4%</td>
</tr>
<tr>
<td>Aged 30 or over</td>
<td>17.9%</td>
<td>47.6%</td>
</tr>
<tr>
<td>Studying full-time</td>
<td>99.1%</td>
<td>92.1%</td>
</tr>
<tr>
<td>Studying part-time</td>
<td>0.9%</td>
<td>8.0%</td>
</tr>
<tr>
<td>2014 registration</td>
<td>42.2%</td>
<td>20.2%</td>
</tr>
<tr>
<td>2015 registration</td>
<td>45.8%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Other registration year</td>
<td>12.0%</td>
<td>66.1%</td>
</tr>
</tbody>
</table>
4. Research results

4.1. Research excellence

The principal question that this criterion seeks to establish is whether the training and training environments within the DTPs incorporate scientifically excellent and original research. Perhaps unsurprisingly, given nature of the surveys and their timing (i.e. for a broadly mid-term evaluation), the survey responses did not provide significant information on the extent to which the research being undertaken was excellent. Information on some of subsidiary aspects – such as the nature of the students and of their supervision – is covered in other sections.

Through the interview process (i.e. during institutional visits), the TAB members who conducted the interviews overwhelmingly perceived that the standard of the research being undertaken was high overall with some excellent research in all the DTPs. They cited institutions’ reports that even at these relatively early stages for Cohorts 1 and 2, there were instances of students publishing papers, attending conferences to give research papers and winning academic prizes in their institutions, in addition to undertaking outreach work and public engagement activities.

A question in the survey of non-academic partners specifically asked them to rate the quality of the research arising from students. As Figure 1 shows, over half felt it was too early to tell, although nearly three quarters of those who did venture an opinion felt that the quality was very good and none felt it inadequate.

Figure 1. Perceptions of quality of scientific research arising from DTP students, as indicated by non-academic partners (N=52)

The evaluation did, however, provide some evidence of difficulty in balancing recruitment of the best students with meeting one of the research objectives of a DTP which is to cover a range of particular areas within NERC’s scientific remit. DTPs were giving student excellence high priority and were recruiting excellent students, although on occasion this could mean that they struggled to fill projects within certain remit areas. This did not appear to result in a
compromise on student quality to fill such remit gaps, but rather was an acknowledgement that some remit gaps would exist if they prioritised student excellence.

Overall, the evidence available at this stage suggested that all the organisations involved in the DTPs have excellent research environments and researchers, and that the DTP partners themselves are producing excellent research. This was part of the original assessment of the DTP proposals and where any new partners have been added to a DTP, TAB members approved such changes to ensure that research excellence is maintained and that existing partnership expertise is complemented by any such additions. It therefore seems reasonable to say that students are being trained within excellent research environments.

### 4.2. Training excellence

#### 4.2.1. Supervision

The surveys offered a range of insights into the training experience received by the students, including perceptions and information about (i) their supervision, (ii) the developmental activities they were undertaking, and (iii) their experiences of training within a DTP cohort.

On supervision, 80% of DTP student respondents (N=462) felt that their supervisory team was very good in terms of its scientific expertise and competence, 17% that it was good and 3% adequate (with only two respondents suggesting it was poor). As Figure 2 illustrates, this appeared to be a slightly more positive view than was expressed amongst the non-DTP respondents (N=128), although that too was very positive. Unfortunately it is not possible to benchmark these results against the Postgraduate Research Experience Survey (PRES) as the questions in the respective surveys are not directly comparable.

![Figure 2](image)

Figure 2. Students’ rating of the scientific expertise and competence of their (combined) supervisory team

There were also slight differences in these results for Cohorts 1 and 2, with respondents in the second cohort rating supervisory competence and expertise slightly more highly than those in the first, although the magnitude of these differences is only just significant on the
basis of the confidence interval at a 95% confidence level. On the other hand, there was no significant difference between the results of male and female respondents, nor between those who were CASE students or not.

Figure 3 summarises the reported frequencies of meetings with supervisors. For DTP students (N=461), 42% reported that they met with their primary academic supervisor at least weekly, and 88% at least monthly. Although the proportion of DTP students who met with their supervisor weekly was lower than amongst non-DTP students, the proportion meeting at least monthly was higher amongst the DTP students. A slightly higher frequency of meeting with primary academic supervisor was reported by DTP students in Cohort 2 than Cohort 1.

Figure 3. Frequency of meeting with supervisors, reported by students

Respondents were asked to comment on whether they thought this frequency was appropriate. Their comments revealed that in the overwhelming majority of cases students felt that the frequency with which they were supervised was appropriate and they felt well supported in this respect. Many commented that the frequency varied with the stage of their project, which again was highly appropriate, and many others that their supervisor was open to meet more frequently if needed.
Only in a small minority of cases (around 1% of the respondent sample) were students not happy with the frequency of primary supervision. These few cases were instances where the supervisor was reported to be too busy to provide the frequency of supervision sought.

In comparison, meetings with other academic supervisors (N=410) were somewhat less frequent, with 38% of DTP students reporting doing so at least monthly and 72% at least quarterly. These proportions were higher amongst DTP students in Cohort 2 (48% at least monthly, and 78% at least quarterly). Only 52 respondents provided comments indicating whether they felt this frequency was appropriate, with all but two of these considering that this level of support was adequate for them.

A frequency of meeting with non-academic supervisor/s was reported by far fewer respondents (N=80), the majority of whom were CASE students. Few of these were in Cohort 2 as their research projects were presumably at a relatively early stage. Nonetheless, the results suggest that over 40% were having a meeting with their non-academic supervisor at least quarterly, and almost two thirds meeting at least every six months (and these proportions somewhat higher amongst the CASE students). All of the respondents who commented on this frequency considered that it was appropriate.

45% of DTP students rated the support that they received from their organisation and/or supervisors to produce research outputs as good or very good, 40% that it was adequate and 14% poor (and 1% very poor). Although a minority of respondents provided comments, many of them felt that they were yet to reach a stage in their project where they needed to produce research outputs such as publications, but rather were focusing on conducting research. A sizeable number of students also assumed that this type of support would be provided by their supervisor rather than the DTP (and some assumed that the interest of the DTP was more in developing multidisciplinarity than research outputs).

4.2.2. Training needs

In total, 58% of the DTP student respondents (N=460) reported that they had undertaken a training needs analysis (TNA – which was defined for them as a review of the specific training courses, activities or support measures that would be beneficial in completing their doctorate based on their previous qualifications and experience). This proportion was similar for those in Cohorts 1 and 2. The proportion amongst non-DTP students was lower at 46% (Figure 4).

It should be noted that many of the students consulted during the DTP visits did not recognise the definition of a TNA, but when they did so they reported that they had received this type of input. It may be that, even with the definition given in the survey question, students have under-reported the incidence of TNAs. Improved ‘labelling’ of elements of their training programme including the TNA, to improve the consistency of understanding by participants of what they are taking part in, could be beneficial both to them and also in future investigations of the DTPs and their impact.

With that caution, of those who reported having a TNA, 89% believed that the training that had been offered had been appropriate. This proportion was 86% amongst DTP students in Cohort 1 and 95% in Cohort 2.
58% of those who reported that they had not had a TNA thought that they would benefit from having one. This proportion represented just under a quarter of all DTP student respondents, leaving around 18% of students neither having had a TNA nor feeling that they would benefit from having one.

13 of the 15 DTP lead organisations reported that they used TNA to tailor training provision to student needs. In the visits it appeared that all DTPs were tailoring their training provision to their students at least to some extent, so this suggests that the remaining two DTPs did not recognise or use the TNA terminology, rather than that they were not tailoring provision.

Non-academic partners were asked in their survey to name up to five priority skills that their organisation looks for when employing PhD graduates. The partner respondents indicated a wide range of different types of knowledge or skill (and/or detailed articulations of these types of skill). Table 3 lists the most commonly cited types, when all were aggregated together. This shows that the two most common demands were for communications skills and for academic or technical subject knowledge. A significant number of the respondents indicating their priority for communications skills said they particularly sought the ability to explain technical issues to a less expert audience (and several specifically excluded academic writing skills from their needs), and a few specifically mentioned this in relation to public engagement. Those stating the importance of subject knowledge saw this either in relation to the subject matter of the research and/or their organisation’s own specialist area.

The next most commonly cited needs were for coding and other computing skills in relation to data handling (such as for visualisation), high levels of numeracy including statistics, the ability to synthesise important information from analysis of literature or data, and adaptability (or flexibility).

Although team-working and organisational skills (including project management) were quite commonly cited, it is interesting to note that very few non-academic partners prioritised their need for creativity or innovation, or for policy awareness.
Table 3. Most common priority skills needs for non-academic partner respondents (N=55, up to 5 responses each)

<table>
<thead>
<tr>
<th>Skill type</th>
<th>No. of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Non-academic) communications skills, including public engagement</td>
<td>39</td>
</tr>
<tr>
<td>Academic/technical subject knowledge</td>
<td>31</td>
</tr>
<tr>
<td>Coding/IT skills for data handling, including visualisation</td>
<td>18</td>
</tr>
<tr>
<td>Numeracy and statistics</td>
<td>16</td>
</tr>
<tr>
<td>Organisational skills and project management</td>
<td>11</td>
</tr>
<tr>
<td>Adaptability / flexibility</td>
<td>11</td>
</tr>
<tr>
<td>Skills of synthesis</td>
<td>10</td>
</tr>
<tr>
<td>Teamworking</td>
<td>8</td>
</tr>
</tbody>
</table>

Amongst the 55 non-academic partner respondents, 13 indicated that they found it quite easy to recruit people with these skills at PhD level, while 20 indicated that it was difficult (and the remainder felt it was neither easy nor difficult). On the other hand, from their knowledge of the NERC DTP scheme, 36 out of 43 of these respondents felt that the scheme would help to address these skills needs in terms of improving the quality of PhD graduates.

4.2.3. **Subject-specific training**

Just over half of DTP respondents (54%) felt that the amount of subject-specific training (i.e. training that was not core to the PhD project but related to the subject and which would be desirable in completing the doctorate) was just right, see Figure 5. A further 37% felt that the amount was too little (31%) or far too little (6%), while 9% felt that it was too much. These proportions were very similar across the sub-groups analysed, including CASE and non-CASE students, although a somewhat higher proportion of female students felt that there had been too little subject-specific training.

Figure 5. Perceptions amongst DTP student respondents of the quantity of provision of subject-specific training (N=434)
DTP students’ perceptions of the benefit they obtained from the subject-specific training were very positive, with 82% believing that it was somewhat (47%) or very beneficial (35%) to them. Figure 6 shows that the proportion of DTP students in Cohort 2 feeling that it was beneficial to them (83%) was marginally higher than in Cohort 1 (80%), and fewer felt that it was not beneficial, but these differences are at the margin of significance statistically.

Figure 6 DTP students’ perceptions of how beneficial their subject-specific training has been personally

4.2.4. Transferable skills training

The survey asked parallel questions in relation to transferable skills training, which was described as training unrelated to the PhD project in skills which may be useful in a student’s future career. In this case, 70% of DTP students felt that the extent of provision was just right, 20% that it was too little, and 10% too much (Figure 7). A slightly higher proportion of DTP students in Cohort 2 (22%) felt the amount should be greater, compared with those in Cohort 1 (19%), while slightly fewer felt that it was just right, although these differences were not statistically significant.

Although there is no directly comparable question in national surveys of those undertaking doctoral programmes, these results should be seen in the context that under half of all doctoral students in the UK in their first or second year report that they have received any transferable skills training at all.² Embedding transferable skill development within PhD training is a core facet of the DTP model, so it seems clear that the extent of this type of training within the DTP model, at least at this stage of their programme, is significantly higher than for the ‘average’ UK PhD student.

In addition, just over three-quarters of the DTP student respondents felt that they had an appropriate amount of control over the amount and type of training that they were doing.

² Postgraduate Research Experience Survey 2015: The Research Student Journey, Higher Education Academy
Figure 7. Perceptions amongst DTP student respondents of the quantity of provision of transferable skills training

The proportion of DTP students that reported their transferable skills training to have been very beneficial was just under one quarter, and a total of over 80% suggested it had been either very or somewhat beneficial, which was a little higher than the case for non-DTP students. A small proportion (6%) of the DTP students considered it had been detrimental as opposed to beneficial, whereas this was 13% of the non-DTP students. There were only relatively minor differences between the responses from Cohorts 1 and 2 (Figure 8).

Figure 8. DTP student respondents’ perceptions of how beneficial their transferable skills training has been personally
CASE students’ views amongst the DTP student respondents appeared to be very similar to those who were not undertaking CASE studentships, both in relation to the quantity and the perceived benefits of transferable skills training. However, of the small proportion of respondents who felt there was too much transferable skills training, almost none were CASE students. It seems likely that as CASE students are exposed to working environments outside academia, or know that they will be in the future, they see more benefit in learning transferable skills. Perceptions about the extent and benefit of transferable skills training were similar for male and female student respondents.

The students were also invited to reflect on whether during recruitment they had been informed of the wider training opportunities offered by being part of a DTP. Two thirds of DTP respondents indicated that this had been the case, although this was markedly higher for Cohort 2 respondents (74%) than Cohort 1 (59%). Overall, 79% thought that their training experience had proved either similar or exactly the same as had been indicated during recruitment and, again, this was higher (86%) for Cohort 2 than for Cohort 1 (70%).

Approximately one third of the DTP students had undertaken broad skills training (on themes such as data collection and project management) in the period between starting their programme and beginning their research project. Of these, 78% believed that it had been very (44%) or somewhat (34%) beneficial. The 78% figure is similar to the proportion reporting benefit from their subject-specific or transferable skills training overall, although the proportion reporting it very beneficial was higher than overall. This seems to suggest that pre-project training is seen positively by those undertaking this model of programme.

4.2.5. Other training programmes

DTP respondents also reported on their intentions and expectations in relation to a range of wider training opportunities open to them outside the DTP programme. Figure 9 summarises these results, illustrating that around half had already taken part in or registered for a NERC Advanced Training Short Course, and around a third on other short courses. Just over half had taken part, registered for or intended to take part in a summer school.

In contrast, very few had taken up an internship, although up to one third of respondents said that they intended to do so (and nearly a quarter an RCUK policy internship). The question stated that this referred to internships other than CASE placements, but analysis showed that a higher proportion of CASE students than others intended to undertake an internship in addition to their CASE placement. Relatively few students intended to take part in the Environment or Biotechnology YES schemes. Other than for the latter, more than 70% of respondents appeared to be aware of these opportunities; the proportion who reported being unaware of internship opportunities was around a quarter (lower for CASE students).

Of the 290 student respondents who had taken part in one or more of these training opportunities, 94% said that it had been very (56%) or somewhat beneficial (38%) to them. The vast majority of comments made about the nature of perceived benefits related to short course attendance, which in most cases had been on research techniques – and had been found very useful.

Roughly one in five DTP student respondents reported that they had participated in innovation- or entrepreneurship-related training within the DTP. This proportion was higher for those in Cohort 1, suggesting that this was activity that tended to take place in the second year rather than first year of a PhD.
Those who did not intend to pursue these opportunities were asked why not. Their responses could be clustered into a range of themes, of which the first was most commonly cited:

- They did not see that these ‘wider’ opportunities were relevant to their research (or in some cases ‘applicable’ to their research) and/or doubted that they personally would find any value from these wider opportunities, due to that perceived lack of relevance either to their research now or to an expected future career in research;
- They felt that such opportunities would not be a valuable use of their time as they would distract them from their research;
- Some already had similar experiences from an earlier career stage;
- In relation specifically to internships, they did not want to extend the length of their studentship in order to accommodate an internship.

### 4.2.6. Induction

Almost every DTP student surveyed (99%) said they had taken part in a formal induction on arrival in the DTP, the most common elements of which were to meet other DTP students (92%) and meet the DTP management team (78%), see Figure 10. Almost two thirds of them attended a compulsory training course (63%), while substantial proportions attended an induction field trip (47%) or a conference event (29%). The proportion who met their supervisors during induction at 68% presumably reflects that a significant minority of DTPs were operating a model whereby students were not associated with a specific research project for some period of time, and so could not have met their supervisor during the induction period.
The perceived quality of the initial induction was relatively high amongst DTP students, with 74% reporting it very good or good, a further 22% adequate, and only 4% thinking it poor. This quality rating was significantly better for respondents in Cohort 2 (2015 starters) than Cohort 1, with greater proportions believing it to have been good or very good (Figure 11), and no students at all reporting it to have been very poor. In comparison, a slightly lower proportion of students outside the DTP (68%) felt their induction had been very good or good, and a much higher proportion (15%) had not had an induction at all.

Figure 11. DTP students’ perceptions of quality of their formal induction (N=423)
4.2.7. Resourcing and other support

Almost three quarters of DTP respondents (74%, of N=434) believed that their PhD project was adequately resourced in terms of finances and access to equipment, with 6% uncertain and 20% suggesting that it was not. These proportions were very similar for respondents in both cohorts.

Amongst those who reported insufficient financing, the most commonly reported issue (by some way) was that the Research Training Support Grant (RTSG) did not cover the costs of fieldwork overseas, while a few others commented that the nature of their research activity was particularly expensive and so a ‘flat’ RTSG amount for all studentships would be problematic. This seems to suggest that whether the amount of £11,000 is enough will depend very much on the particular project.

Several commented that the RTSG was insufficient to cover the range of costs that they anticipated, which could include IT equipment, fieldwork and laboratory costs, as well as potential conference attendance expenses. Some others reported the need to apply for additional funding from other sources in order to finance this range of costs, and it could be that more support should be provided to help them identify these and pursue such funding.

In relation specifically to IT facilities, a small but significant number of respondents reported perceived inconsistencies in relation to provision of hardware, and in some cases licences for specialist software, by their institution, and that they had purchased this with their RTSG. Provision of adequate routine computing facilities is expected within institutions’ requirements to provide Research Council-funded PhD students with adequate facilities and resources. However, in the case where specialised equipment or facilities are required for fieldwork, or access to specialist software not already held by the institution is needed, then the RTSG should be used. It could be useful to clarify to students through a handbook or other documentation the expectations of the hosting institution and student in this respect.

It should be re-stressed that, overall, three quarters of DTP respondents were content that their studentship was adequately resourced. In terms of the environment in which they were conducting their doctorate, 70% of DTP students felt that their workspace (desk, storage, computer facilities etc.) was good or very good, and a further 20% felt it was adequate, with 10% demurring. Higher proportions rated positively the library facilities (85% good or very good, and below 3% poor) and the online resources and remote working support to which they had access (79% good or very good, 3% poor).

Of those who had spent time with a project or CASE partner, again, around 80% reported that the resources and workspace provided had been good or very good.

4.2.8. Integration within the DTP cohort

One of the key features of DTP training is the existence of the cohort and the potential benefits that arise through training within a cohort of PhD students. The DTP lead organisations were asked in a survey question to rate the level of integration of the whole student cohort across their DTP (which it defined as the students coming together through some active interaction, either physical or virtual). All but two felt that their cohorts were fully

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3 Universities may also ‘top-slice’ this amount by varying degrees, so not all students will be able to access £11,000
or well-integrated. The academic partners were asked a similar question which yielded proportionally similar results, and were able to describe many of the practical ways in which students in the cohort were brought together, although they did not express views as to what impact this had.

72% of all DTP student respondents felt that the DTP and its cohort provided them with a supportive network for practical, scientific and personal issues. The perceptions of this support were considerably more positive amongst Cohort 2 students than Cohort 1 (see Figure 12), with over 80% perceiving that it was very or moderately supportive. There were slight differences between types of student, with female students and CASE students tending to feel somewhat less positively about this than average, although the difference was not substantial.

Figure 12. Perceived extent amongst DTP student respondents that the DTP provides a supportive network

![Figure 12](image)

Figure 13. Student respondents' perceptions of being part of a well-defined and cohesive cohort of students

![Figure 13](image)

Further, as Figure 13 shows, over half of DTP student respondents felt that they were part of a well-defined and cohesive cohort of students, and this proportion was almost 60% amongst
those in Cohort 2. A further 35% or so of respondents felt to some extent that this was true, while only 5% of Cohort 2 and 11% of Cohort 1 felt it was not. In comparison, fewer non-DTP students felt part of a cohesive cohort and 18% did not feel they were part of one.

DTP student respondents were asked to list up to five benefits of training within a cohort, and also up to five disadvantages. The most frequently cited benefits were clustered around:

- Social benefits of meeting other similar PhD students;
- A feeling of community (some specifically mentioned a reduction in feelings of isolation);
- The opportunity for peer support, both in terms of moral/pastoral support but also help with science- and research-based issues;
- Gaining broader and different perspectives and ideas, including interdisciplinary views;
- Networking and opportunities to collaborate;
- Access to additional and different skills.

Numerically, almost all respondents cited at least one benefit and most listed several, although only a few managed to identify five different benefits. In comparison, fewer listed disadvantages and very few managed to list more than two different disadvantages (and there was a significant number who said there were no disadvantages). However, the most common disadvantages mentioned were, broadly:

- Training had to be relatively general in order to be applicable to all in the cohort, whereas they would have preferred training more specific to their own research;
- Some resented the time taken away from their own research, which could be greater by the need to travel to a location where the cohort could get together;
- There was inconsistent participation in cohort training, with fluctuations in who attended;
- Being in a cohort environment invited students to compare their progress or perceived research quality with others’ (presumably this means unfavourably, we infer).

The responses clearly indicated far more perceptions of benefits and advantages than of disadvantages, reinforcing the overall view that students appreciated that there was a positive impact of training in a cohort. It is interesting to note that the opportunity to train in a cohort had not been ranked highly by respondents in their rationale when applying for a PhD (although in fact training was not ranked highly per se).

4.2.9. Career thinking and training

Figure 14 summarises respondents’ current thinking about possible career directions, in terms of the proportions that would consider working in different sectors. This shows that over 80% of DTP respondents would work in academia, and around half in industry, and a third in policy, the public sector or a charity environment. Although the differences were generally not substantial, slightly more of the students outside the DTPs would consider working in industry and the public sector, and fewer in policy or a charity environment. There was no difference in the relative distribution of preferences between the 2014 and 2015 DTP cohorts, nor substantial differences between male and female respondents. A slightly higher
proportion of CASE student respondents would consider working in industry, but their results were very similar otherwise to those of the overall DTP cohort.

In 2015, just under 60% of PRES respondents reported that they sought a career in academia, although the results are not strictly comparable as PRES respondents could only select a single option from the range of responses.⁴

**Figure 14. Sectors in which student respondents would consider working (multiple responses allowed)**

When asked about how they thought their training would support pursuit of their current career ambitions, almost two thirds of the DTP student respondents (64%) believed that at the end of their PhD they would have the skills necessary to secure a job in their chosen career, while one third did not know and only a handful of respondents felt that they would not (under 2%, of N=389, Figure 15).

Male respondents were more confident in this than females, with 71% of male DTP students believing they would have the skills to secure such a job, but just under 60% of females. CASE students, on the other hand, were if anything slightly less confident.

Interestingly, the proportion of DTP students in the first cohort that were confident that they would have the skills to pursue their chosen career was just under 60%, whereas it was 70% of those in Cohort 2. This could reflect greater confidence amongst those in Cohort 2, for example resulting from improved training for this cohort. On the other hand, it could also or instead simply reflect the somewhat general decrease in overall positivity and confidence that is often seen with progression through a PhD (i.e. those in Cohort 1 were in their second

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⁴ Postgraduate Research Experience Survey 2015: The Research Student Journey, Higher Education Academy
year and less positively minded than those in Cohort 2 who were less than a year in). It is not possible to establish the reasons for this difference from the existing survey data.

Figure 15 DTP students’ perceptions of whether they would have the skills necessary at the end of their PhD to secure a job in their chosen career (N=415)

Just under half of the DTP student respondents (48%) reported that they had had the opportunity, specifically through the DTP, to discuss their career ambitions, and the remaining 52% said that they had not. From the interviews, there was evidence of some perceptions that DTPs should not duplicate effort in relation to services that were already available through graduate schools or elsewhere in the university. Arguably, careers information and support could come into this category, although DTPs should certainly be active in directing students to careers services if they are not providing this themselves. That said, there would almost certainly be value in career-related conversations with academics working in a student’s research field, which would not be available through a more generic careers service.

When these responses were analysed by cohort, differences were seen. 43% of the Cohort 1 respondents said that they had had this opportunity, whereas the proportion amongst Cohort 2 respondents was 51%. Intuitively, such a difference in results for the two cohorts is surprising given that those in Cohort 1 were a year further into their programme than those in Cohort 2 and could have had more opportunity for career discussions or training. However, from the visit information it seems more likely that the higher incidence of career discussions reported by those in Cohort 2 reflects that more training on careers was introduced within the initial training package delivered by DTPs for students in Cohort 2, which may not retrospectively have been offered to those in Cohort 1. An alternative could be that the training or environment for Cohort 2 has been more conducive to students seeking discussions about their career, although large proportions of both cohorts reported that they want to have the opportunity. Another factor could relate to underlying changes in attitude with progression, which could impact on these perceptions.

Most of those who reported that they had had the opportunity for a career discussion (72%) felt that it had been very (13%) or somewhat (59%) helpful, with a further 26% ambivalent about its value. These proportions were the same for respondents from each of the two cohorts. Of those who had not had the opportunity, 82% reported that they would like to have
such an opportunity, suggesting that there is demand from students to be supported in discussing their career options. This high proportion was seen in both DTP respondent cohorts.

It is possible that the relatively low incidence of career discussions specifically through DTPs could contribute to the observation that only 27% of all DTP respondents felt that being part of the DTP had influenced their current career intention, although this was somewhat higher amongst Cohort 1 respondents (30%) than Cohort 2 (25%). However, students’ career thinking and career-related learning will be influenced by many other aspects of the DTP training model, not all of which had yet been experienced by the majority of respondents when surveyed.

The detailed survey results reported in this section are to a large extent reinforced by the findings of interviews with the DTPs. The reviewers identified the existence of some good training models and innovations, and that there were good examples of positive cohort effects, but felt there was a need for more consistency in the planning, timing and availability of elements of the training. Overall, they found an improving picture in relation to training quality, and this is reflected in many of the results where DTP student perceptions were stronger amongst those who started in the second cohort (2015 starters) than the first (2014).

In relation to career thinking, interviews with DTP students indicated that some were not giving sufficient thought to their career ambitions or considering different options, with many assuming that they would progress to academic posts and therefore reporting that they did not need to undertake any structured considerations of career. This does not entirely accord with the survey results but may suggest that DTPs need to play a stronger inspirational role in terms of encouraging more creative (or realistic) career thinking. Taken together, the evidence indicates that facilitating discussions around career options and structured reflections on realistic career intentions should be themes picked up in future monitoring or evaluation studies of the DTP cohorts.

4.3. Multidisciplinary training environment

The essence of the DTP model is not only that it is cohort-based PhD training (which makes it inherently multidisciplinary to some extent) but that it is delivered through a partnership, which is specifically designed so that the training is embedded in a multidisciplinary environment. This should enrich the student experience and encourage knowledge-sharing and interconnectivity, which will have benefit for research within the environmental sciences but also offer students the chance to develop skills relevant to their future careers. In this section we focus on results that relate to the extent to which the training being offered is in a multidisciplinary environment and whether students are benefiting from this.

It should be noted that as this is broadly a mid-point evaluation of the first NERC DTP scheme, at the time of survey students will only have been in their first or second year of their programme, and would not have undertaken the full range of multidisciplinary opportunities and experiences that will be available to them through the full extent of the programme, such as a placement. It is too early to assess fully the extent of these experiences or their impact on students’ projects or personal development. Instead, there is a focus here on evidence for engagement with partner organisations and especially end-user partners.
At the outset, it is worth recognising that 23% of the DTP student respondents (N=454) reported that they had CASE studentships which by definition are delivered in collaboration with an end-user partner organisation which contributes financially to the studentship and provides a placement. This was 26% amongst Cohort 1 respondents but only 20% amongst those from Cohort 2. A further 4% did not know whether they were CASE students or not.

4.3.1. Interactions with partner organisations

Overall, 71% of DTP student respondents were aware of the key partner organisations in their DTP (this was somewhat higher at 78% amongst those who were CASE students, and around 70% for those who were not). Just over half the respondents (52%) believed that the involvement of these partners was beneficial to their training experience. 22% felt it was very beneficial and 30% somewhat beneficial, with 47% believing that it was neither beneficial or detrimental, and only a handful felt it was detrimental (Figure 16). Respondents in Cohort 1 were slightly less positive in this respect than those in Cohort 2 (49% feeling it very or somewhat beneficial, compared with 53%, respectively), although these differences are at the margin of significance statistically. These results were broadly similar for those who were CASE students and those who were not.

Figure 16. DTP student respondents’ perceptions of the benefit to their training experience of having partner organisations in the DTP

It could be argued that students are not the best placed to comment on the overall value of partners to a DTP partnership. While not all academic partner respondents believed in the value that the entire range of partners brought, the majority did so and there was evidence in the interviews that the level of interaction between partner organisations, and also between different departments within host institutions, had increased greatly as a result of their participation in the DTP, and that this was seen as an additional positive outcome.
4.3.2. Interactions with students across the DTP cohorts

Students were very positive about their interactions with other students facilitated by the DTP structure. 44% of the DTP student respondents had already had an opportunity to attend a training event or conference hosted jointly by more than one NERC DTP, which could also contribute to multidisciplinary understanding by virtue of the involvement of different lead organisations and potentially also partners. Although only around two thirds of these respondents reported on their experience of actual attendance at such an event (N=102), 71% of them had found it very or somewhat beneficial. This seems to suggest that student respondents felt there was more value in interactions that involved other students across the DTP cohorts than with the partners within their own DTP. It is also interesting to note that 44% of DTP student respondents felt that there was not currently enough interaction between student cohorts in different DTPs (with 55% suggesting that there was the right amount). This could be interpreted as an indication that students perceive significant value in interactions with other students across the overall DTP community in addition to their interactions with partner organisations in their own DTP.

More interactions with students right across the full range of DTP cohorts would build upon the whole-cohort interactions that students are already having with other students in their own DTP. Figure 17 illustrates the frequency with which students were interacting as a whole cohort, physically or virtually, right across their own DTP including interactions hosted by partner organisations. Fewer than 3% said that they never did this and 20% that they did so at least monthly. Overall, the vast majority (85%) felt that this was about the right frequency for this type of interaction.

Figure 17. Reported frequency of whole-cohort interactions with other students, by DTP student respondents (N=398)

There was some evidence to suggest that many of the interactions with students in other DTP cohorts may have been within discipline rather than multi-disciplinary. Although this question used a more subjective scale than that underlying Figure 15, three quarters of DTP student respondents indicated that they interacted on a professional level only a moderate amount or very rarely with other students outside their research area (Figure 18). Three
quarters of the respondents felt that this was an appropriate frequency of interaction, while the remaining quarter felt it should be higher.

Comparison of results from these two questions requires some inferences to be made, so in any future evaluation it could be useful to probe more consistently the nature and perceived value of different types of student and whole-cohort interactions.

Figure 18. Frequency of interactions with other students outside DTP student respondents’ research area (N=399)

<table>
<thead>
<tr>
<th>Interaction Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the time</td>
<td>30%</td>
</tr>
<tr>
<td>Often</td>
<td>20%</td>
</tr>
<tr>
<td>A moderate amount</td>
<td>25%</td>
</tr>
<tr>
<td>Very rarely</td>
<td>7%</td>
</tr>
<tr>
<td>Not at all</td>
<td>8%</td>
</tr>
</tbody>
</table>

4.3.3. Interactions with end-user organisations

In relation specifically to non-academic (i.e. end-user) partner organisations, 54% of all DTP student respondents reported that they intended to spend, or had already spent, time with one of these organisations during their PhD, and 46% that they did not or had not. These perceptions differed between those who were CASE students and those who were not. Over 75% of CASE students reported that they had spent or would spend time with an end-user organisation. Strictly this figure ought to be 100%, as CASE students are required to undertake a placement for the studentship to be considered as CASE. This confirms the earlier observation that not all students understand whether they are a CASE student or not, and/or that CASE students are not fully clear of what such a studentship requires and involves.

Amongst those who reported they were not CASE students, 45% reported that they intended to spend time with an end-user organisation, and 55% said that they did not. The proportion expecting to spend time with an end-user partner was fractionally higher amongst Cohort 2 respondents than Cohort 1.

Those who responded that they had not spent or did not intend to spend time with a non-academic partner were invited to give reasons why. The types of reasons cited, broadly in descending order of frequency, included that:
• They felt their research was purely academic and that no policy or end-user organisation was relevant or would be interested in their research (most commonly);
• They were in principle interested but did not know practically how to pursue this;
• They wanted to pursue an academic career and so thought this was not relevant to them;
• They were already collaborating with other partners who would provide similar experience;
• They did not think that they would have results to share until late in their project;
• They felt doing their research was their priority and that there might not be time in their studentship to do this;
• They already had career experience outside academia so the benefit to them would be limited.

In addition, a number of CASE students stated that they did not need to because interaction with an end-user organisation was inherent in their studentship or project.

From this it seems that there remains some scope to ‘educate’ students that there could be benefit in spending time with an end-user organisation irrespective of their career intention, and that it could actually enhance their research. However, there is also scope to support students in terms of identifying a potential partner, as many seemed to take a very narrow view that a close tie to their personal research project would be required (i.e. that the benefit would have to be for the partner rather than for them as student). It should also be remembered that amongst the wider population of PhD students surveyed in PRES, only around 1 in 10 report that they have undertaken an internship or placement.

Amongst the DTP students who had already spent time with a non-academic partner organisation (N=92), 43% thought the experience would be very beneficial to them in the future career and a further 28% somewhat beneficial. Although only just over 50 respondents answered questions about more specific benefits of this experience, two thirds said it had been very beneficial to their project and slightly over two thirds very beneficial to their personal development. Results from those who were CASE students were marginally higher than others, but the sub-sample sizes are small. The quality of supervision they received from end-user organisations was also good, with over half reporting very good supervision, a further quarter that it was good and only one respondent that it was poor.

It will be important to revisit these perceptions once more students have taken part in non-academic partner interactions such as placements, to see whether these early very positive experiences are consistently reported across the cohort. If so, there would seem to be merit in using these positive messages from students to promote the interest in and take-up of these opportunities more widely, given that only just over half of students anticipate spending time with a non-academic partner. The results of the question reported in section 4.2.5 on participation in internships are also relevant here.

These results need also to be seen in the context of the expectations of the end-user organisations. Of the 55 non-academic partners who responded to their survey, 45 had already hosted or expected to host a placement or internship, so there was clearly an expectation from most that their engagement with the DTP training would include time spent with students either on placement or in other types of training interaction.
4.3.4. **Supervision by partners**

Only two of the 15 DTP lead organisations reported that they had a policy stipulating that individual student projects must have academic supervisors from different disciplines, although most of them stated that the majority of the PhD projects they were hosting involved multiple partners.

A total of 80 DTP student respondents reported the frequency of meetings with a supervisor from a non-academic partner, which was just over a quarter of respondents to this question, the remaining three quarters indicating it was not applicable to them. From this we can infer that three quarters did not have such a supervisor. As reported in section 4.2.1, most of these respondents were CASE students, and relatively few other students had a non-academic supervisor. Analysis is limited in its robustness because the respondent subsamples involved were small, but around 1 in 5 CASE students were meeting their non-academic supervisor as often as monthly, and around half at least quarterly, and few less frequently than twice per year. Those who were not CASE students tended to be meeting this type of supervisor less frequently, although the number of these respondents was very small.

It was notable that of the 24 non-academic partner organisations that reported providing supervision, 22 were interacting with their respective primary academic supervisors on at least a quarterly basis, suggesting that some of the non-academic partners are strongly engaged in their DTP partnerships. However, it should be remembered that this number represents a small proportion of the total number of non-academic partners across the DTPs, many of which seem not to be strongly engaged based on the evidence available from interviews (and possibly also from the lack of response to the survey by the majority of them).

4.3.5. **Increasing interactions and engagement**

From the survey evidence presented in this section, we infer that the extent to which advantage is being taken of multidisciplinary opportunities specifically through non-academic partners (end-user organisations) is very varied, although it is perhaps too early to review this robustly and, besides, there are many other aspects to multidisciplinary training. The evidence suggests that by no means all the students are convinced of the benefits of having multiple partners (academic or non-academic) involved in their projects, and a substantial proportion do not anticipate engaging closely with non-academic partners. This is perhaps not entirely surprising, as the nature of the PhD training offered by a DTP (including transferable skills training) was not one of the main motivating factors identified by DTP students in being attracted to their PhD; the project, supervisor, institutional reputation and location were all rated more highly.

On the other hand, of the minority that have interacted with non-academic partners to date, there is evidence for strong perceived benefits. This would suggest that there is a job to be done to inspire students and convince them of the potential benefits of interactions with non-academic partners, and that those benefits will not only be for those seeing a career outside academia but also for those anticipating an academic career, as well as more immediate value in relation to conducting their PhD project.

Interviews with the DTPs identified a lower level of involvement of non-academic partners than had been anticipated based on original DTP proposal documents. The survey evidence from the 55 responding non-academic partners reinforces this view to some extent. Just over
half (27 of 52) felt that their organisation was not an integral part of the DTP partnership, although many of these felt content with this situation and stated that it was appropriate to their circumstances. However, around a quarter thought their level of engagement was not appropriate (and over half said they did not know how decisions were made). On the other hand, roughly two thirds felt that their level of engagement was appropriate, and 45 out of 53 would engage with DTPs in a future scenario. This seems to suggest that some end-user partners are happy with not being an integral part of the DTP arrangement, and that variability in engagement of non-academic partners is to be expected.

Therefore, perhaps a question to be considered is what is realistic in terms of the nature of engagement of non-academic partners, and how many can be expected to engage deeply. We do not have evidence through the 55 non-academic partner survey responses as to whether these reflect the entire range of opinion across all such partners, or whether they represent the views solely of ‘more engaged’ partners (i.e. those who were at least engaged enough to respond to the survey). If the latter is the case, then the overall extent of engagement is potentially relatively low, and certainly lower than had been described in the original proposals. Further information as the DTPs progress will be important to determine whether this is an issue of unrealistic or naïve proposal-writing, or whether it relates to inadequate focus and effort by DTPs to engage non-academic partners that want to be involved strongly.

On the basis of the information available from both surveys and interviews, it seems of concern that 43 out of 53 non-academic partners in the survey reported that they were not involved in transferable skills training, which is surely a missed opportunity. It is also possible that the lack of involvement of non-academic partners could be contributing to the general low interest in and extent of career training and discussions.

4.4. Excellent students

We note that the descriptor for this criterion is not so much the excellence of the students literally (however that might be measured) but whether the DTPs are attracting and recruiting the right or ‘best-fit’ students, in terms of individuals whose previous training, experience and skills best suit the type of training being undertaken. While some evidence of recruitment practices and experiences was available, evaluating whether the ‘right’ students are being recruited is difficult as, strictly, this would need both a range of measures (of what constitutes ‘right’) and the information about students to differentiate between them in terms of such characteristics and previous experiences (information which was not available). We are therefore reliant on a variety of proxy information, although it should be noted that the reviewers who made visits to the DTPs gained the impression that DTPs were attracting the ‘right’ types of students and were very largely content with this aspect of the scheme, expressing few concerns in this area.

One possible measure of ‘fit’ of the students can be gained from students’ overall feelings of satisfaction with their experience of training within their DTP. 91% of all DTP student respondents would recommend the DTP PhD training experience to others contemplating embarking on a PhD, based on their own experience so far. Without question, this is a strong endorsement of the model and its current implementation, and is at least some evidence that the fit between the students and the model is reasonably appropriate.
Set against this is possibly the evidence that a significant proportion of the students, as we have seen, were not at this stage convinced of the benefit of the involvement of multiple partners, nor of the benefits of their own potential engagement with non-academic partners personally. In this respect, it could be argued that a significant number of the students are not an ideal ‘fit’ to the partnership-based training model or programme.

Two lines of evidence relating to student recruitment were, however, available, which shed some light on this question. 97% of DTP student respondents felt that the process by which they had been recruited was appropriate, although only 60% felt that during the recruitment process they were informed of the format of the PhD training programme, such as the presence of any compulsory training modules, how their project would be selected, and so on. In section 4.2.4 we also saw that roughly two thirds of respondents said that they had been informed about the wider training opportunities that would be available during the DTP programme. This suggests that the majority of students, but not all, had been informed about the nature of the training, and so potentially could have made a well-informed choice – which ought to result in a good student ‘fit’. However, the observation that perhaps 30-40% of students had not been informed of the format, or at least perceived that they had not been informed, is of some concern as this could lead to a potential lack of fit between student and model or programme. This is perhaps reinforced by the evidence mentioned in the previous section about students’ motivations for their choice of PhD, where results indicate that the range of training opportunities and the concept of being trained within a cohort were the two factors rated least important by students when they selected their programme.

Although the overwhelming majority of students felt that their recruitment process had been appropriate, it is worth noting in practical terms that only two of the 50 non-academic partners responding to this question in their survey had been represented on the student selection panel, and only five others been involved in all applications to their DTP, while 12 had been consulted in relation to the applications in which they were directly involved. The remaining 31 organisations (i.e. 62%) had had no involvement at all in student selection or recruitment, although in total 41 of these 50 respondents felt that their level of engagement in this was appropriate. In comparison, almost all the academic partners were involved in recruitment, and three quarters felt deeply involved in the process for students they hosted. These results tend to suggest that the selection process is essentially ‘academic’ in the sense of being reliant dominantly on the lead and academic partners.

There was some related evidence from DTP interviews that often the DTP programmes were oversubscribed, implying that the DTP partners had an opportunity to select the right type and quality of students. Where concerns were noted was in relation to how and whether DTPs were striking the right balance between recruiting the ‘best’ students and implementing PhD projects across the disciplinary range to which the DTP had committed. Some institutions reported some tension in this regard, namely between the desire to recruit the most able students and their commitment to deliver projects within certain disciplines, some of which appealed less to the most able students. The question is therefore raised of how institutions define the ‘best’ or ‘right’ students, with evidence from this evaluation suggesting that in many cases it is currently the most academically excellent.

DTP lead organisations’ survey responses confirmed that there was a challenge in attracting students to certain research areas and types of project. Specifically, survey responses suggested that projects in atmospheric and soil-related sciences tended to attract fewer applicants, so there is at least a theoretical risk that this could result in weaker students being recruited to projects in these areas. However, institutions appeared to be prioritising
student excellence. The most commonly reported issue, however, was in relation to recruitment for projects requiring advanced numerical skills. For these there tended to be a shortage of highly numerate graduates, either from biological subjects or from physics, engineering or mathematics backgrounds, while there was an abundance of applicants from the biological backgrounds with weaker numeracy skills who might be less able to cope with a highly numerical project without additional training.

4.5. Quality assurance
Under this criterion we will present a range of evidence in relation to operational management of the DTPs, based on survey evidence but also the visits to DTPs by TAB members (which were informed by the original proposals and information from NERC’s own monitoring mechanisms).

In a more literal interpretation of the criterion, the survey responses suggest that suitable processes are in place in relation to certain aspects of quality assurance, such as supervision. Procedures were in place in all DTP lead organisations and almost all academic partners to address any cases of inadequate supervision, and in around 20 of the responding non-academic partners (of whom 29 reported that they were involved in supervision). It was also noted that these processes to address inadequate supervision had very rarely been required, and never in most of the partnerships. Training in supervision had been provided to 15 non-academic partners, which appeared to be about half of those involved. Annual reports from the DTPs suggested that all the DTPs have processes in place to ensure adequate training and quality control of academic supervisors, often utilising institutional policies that were already in place.

Another area where there appeared to be almost universal good practice was the incorporation of processes by which students could provide feedback to DTP management. In fact, there were some anecdotal comments that institutions were seeking feedback too frequently.

Overall, the evidence from the surveys and interviews with the DTPs indicates that the DTPs were generally operating and being managed well, although some concerns were noted in relation to a number of specific issues. The survey responses from DTP leads, academic and non-academic partners provide an enormous amount of detailed information and some validation for these general views, with the caveat that there is uncertainty as to how representative are the 55 responses from non-academic partners, when there appears to be great heterogeneity in both their type and extent of engagement and how much they want to engage in the first place. Detailing all of the information collected about the functioning and management of the partnerships is beyond the scope of this report, so only certain aspects are identified here, chiefly those which to relate to issues raised by the reviewers.

4.5.1. Partnership integrity and engagement
It is potentially useful to understand the roles of the partners responding to the survey as context to discussion of their perceptions of engagement and integration. Of the 79 academic partners responding to the survey, which was the majority of this type of partner identified by the DTPs themselves, 67 were hosting studentships, 71 were providing co-supervision and 46 providing some aspect of training (and around half of them providing match funding). Non-academic partners were not asked to provide the same information, but around half had a
role in supervision but only 11 of the 55 responding partners reported that they were involved in providing training.

Two thirds of the DTP leads reported that most of their PhD projects were multi-partner in nature, and this was largely corroborated by evidence from the academic partners (although they tended to state lower percentages that were multi-partner, and a quarter of them suggested that multi-partner projects were not the majority for them).

With that context, it was interesting to note varied perceptions of integrity within partnerships. All 15 DTP lead organisations thought the level of integrity across their partnership was good or very good, but roughly one third of the academic partners and over half of the responding non-academic partners felt that they were not an integral part of their partnership. That said, two thirds of the academic partners felt not only that they were integral to the partnership but that they were equals, and the vast majority felt that the distribution of funding was fair.

From these data we infer that, overall, partnerships were working reasonably well for the academic partners, but the position for non-academic partners was much more variable (even on the basis of the 55 respondents, who may well have been amongst the more engaged of these partners).

Considering one detailed aspect of their involvement, it was noted that half of the supervisors located in non-academic partners were interacting with academic supervisors at least quarterly face-to-face and/or at least monthly online, which seems a relatively consistent level of engagement, although clearly this also means that half were less regularly engaged than this.

Some TAB reviewers expressed concern, based on their visits, that some non-academic partners were engaged only superficially rather than deeply or consistently, so that the shape of the partnership in reality was different from what had been proposed on paper. Two interesting observations in the survey results may shed some light on this.

First, the DTP leads suggested that they had found it difficult to initiate contact with end-user organisations (potential non-academic partners), with only four stating that this was easy. According to the academic partners, the most common means by which they had become involved with their non-academic partner/s had been through an existing collaboration.

Second, there seemed generally to be incomplete buy-in to the concept of a training partnership and the DTP model. All of the 15 DTP lead organisations felt that their supervisors were fully (5) or somewhat (10) supportive of the DTP concept, and none said they were unsupportive. It might be expected that buy-in would be highest in the organisations that lead the DTP and hold the training grant. It is therefore perhaps unsurprising that the picture amongst academic partner organisations was slightly less positive, although around three quarters suggested their supervisors were fully (19 of 75) or somewhat (40 of 75) supportive, with the remaining 16 out of 75 partners suggesting that their supervisors were neutral about the concept rather than supportive or unsupportive (Figure 19).
Figure 19. DTP leads’ and academic partners’ assessment of the extent to which their supervisors are supportive of the DTP concept

On the basis of the survey responses from academic partners, there was some scepticism about the value of providing shared training/networking activities which involved multiple DTPs, although this could in principle deliver aspects of training unavailable within a particular DTP. It was also in contrast to the views of the students, who wanted more of these interactions. However, that scepticism was not evident from those consulted during the interviews.

We infer that there could be some lack of enthusiasm or understanding on the part of some academic partners and leads as to the value of wider partnerships, and this could contribute to the apparent lack of engagement of some non-academic partners, in addition to any reticence or inability on the part of the end-user organisations to engage.

4.5.2. Decision-making and management

Two thirds of academic partners believed that they were always or regularly involved in key decisions about the DTP. The majority (65 of the 79) perceived that the main decision-making method was a management committee, while a minority thought that the DTP lead organisation made the decisions on behalf of the partnership. This could at least partly reflect different management approaches inherent in different types of DTP model or partnership, for example between a multi-institutional partnership model and that of a single HE institution with a few non-academic partners. In total, around half of the academic partners thought that the non-academic partners had an input to decision-making.

The view from the non-academic partners was somewhat different, with half feeling that they had no involvement in decision-making at all and only 8 of the 54 respondents involved in many decisions. As a result, 17 of the 54 felt that their level of engagement in DTP decision-making was not appropriate, and over half of them stated that they did not know how key decisions were made.

Amongst the non-academic partner respondents, 35 of the 54 were not involved in DTP Board meetings, and fewer than half reported involvement in whole-cohort training events. Two thirds were, however, engaged in conference activity, and invitations to conferences appeared in many cases to be the most common format in which their engagement was invited.
Although none of these elements of evidence is totally persuasive, and the results are based on relatively small numbers, they do contribute to a picture in many DTPs where the extent of partnership activity involving end-user organisations is not living up to what was originally proposed. There seems to be scope for DTPs to consider how best to engage these partners to gain the optimum benefit within the DTP but also in relation to partners’ own aspirations, to underpin improved engagement and integration. Amongst the comments made by the DTP reviewers was a recommendation that individual DTPs would benefit from external advisory input from end-user organisation partners, in addition to their management committee.

Overall, although most partnerships were mostly being run reasonably effectively, the picture appears to be of some inconsistency in terms of partnership shape and engagement. Additional feedback based on interviews with DTPs was that a handbook for students, and also one for supervisors, produced by DTPs could be useful. These could clarify the terms and conditions of DTP studentships and therefore the expectations that students should have of their programme and role of partners. It would also help supervisors to be aware of the standards required within the DTP scheme. On the other hand, there was evidence that the more ‘academic’ processes such as supervision were firmly rooted in the individual institutions, so some flexibility of interpretation would almost certainly be required (as in relation, for example, to the Quality Code).

4.6. Produces success stories

This is key to an overall summative evaluation of the NERC implementation of the DTP concept – is the training producing tangible outcomes and impacts? At this stage, broadly at the mid-point of the first five years of operation of the scheme, with no cohorts having completed their programme, it is simply too early to tell. However, there is some emerging evidence that contributes to a potential overall view.

The interpretation from most reviewers visiting the DTPs was that it was too early to assess the extent to which successful outcomes were being achieved. They noted reports of some early academic outputs in the form of publications and conference presentations by students, and also quite widespread public engagement activity in the form of outreach work by the students. A small number of students had won awards or prizes either at institutional or national level.

At this stage the evidence available from participant and partner surveys was limited, and many of the potential measures under this criterion will relate to outcomes and impacts in the longer term which cannot be addressed yet. Nonetheless there are a range of current indications that are positive:

• Very positive views from the students themselves – 91% of whom would recommend a similar experience to others, while 65% them believed that at the end of their PhD they would have the skills necessary to secure a job within their chosen career (and one third did not yet know);

• All the DTP lead organisations and roughly 9 in 10 academic partners thought the DTP will be either beneficial or very beneficial to them, in terms of training higher quality students and generating more high quality research, with two thirds feeling that it would be very beneficial;
Two thirds of the academic partner respondents believed that the DTP would be very beneficial for them, and the majority of the others that it would be somewhat beneficial;

Three quarters of the responding non-academic partners think that, based on their experience, the DTP model will enhance the quality of PhD graduates and make them more employable, due to the range of experiences they undertake (and over half said they would be likely to hire a DTP graduate – although this would be highly dependent on their organisational remit);

Over half of the non-academic partners (who could yet judge) thought the research being undertaken in the DTP projects would be very useful to them;

There was some evidence from the interviews that new collaborations between partners within the DTPs had been spawned by their participation together in the DTP mechanism, as well as greater collaboration between different units within an institution.

DTP students were invited in the survey to list what they saw to be the benefits of being part of their DTP. In many cases their responses were similar to the suggestions they made and which are reported in section 4.2.8 on the benefits of training in a cohort, but the most common impacts that they perceived were the following:

- The opportunity for more training, and also access to a wider range of training opportunities;
- Being part of a community which provided a range of professional support (including from DTP administrative staff) as well as peer support;
- Broadening their view of science around their research and increasing their interdisciplinary understanding;
- Being relatively well-funded as a PhD researcher;
- Having access to other research institutions and talented researchers in them;
- Training within a cohort setting, with all the benefits they thought that brought.

On the other hand, they also listed a few perceived disadvantages, although far fewer respondents gave any responses to this question. However, of the relatively few responses that were given, a number of issues were stated by significant (but small) numbers of respondents:

- Cohort-based training and activities took time away from research;
- More administrative effort was required in a DTP (including giving feedback and responding to surveys);
- There was some confusion as to what was compulsory and what was voluntary within the programme;
- There could be some conflict between DTP and university requirements (or perhaps their perceptions of those requirements).

It would be useful at this point to identify robust indicators of what would constitute positive outcomes and impact of the DTP training, ideally measures that could also be assessed for other PhD students not participating in DTP training. Simple measures such as transition into employment may not be valuable as a very low proportion of all doctoral graduates remains
unemployed after graduation (around 3% nationally, of UK-domiciled doctoral graduates who studied full-time\(^5\)). Earnings will also not necessarily be a useful indicator of a ‘successful’ outcome for doctoral graduates, so it is more likely that an indicator such as the proportion entering particular occupations will be needed, although this also requires knowledge of their original career intentions when starting PhD study. Another option could be some measure of career satisfaction, and this is being considered in the redevelopment of the HESA Destinations of Leavers from Higher Education (DLHE) survey. To identify PhD graduates that undertook DTP training within HESA statistics, it would be necessary to secure and utilise a marker (or ‘flag’) in the respective students’ administrative record.

4.6.1. Results for ‘other’ PhD students and need for a control group

In a few of the charts and results presented, we have been able to show results from the 127 PhD students who responded to the survey who were not trained in a DTP, where they were different from those of DTP student respondents. Overall, it has to be said that for many questions their responses were perhaps surprisingly similar to those of the DTP students, including for some questions where significant differences might be expected (for example, in relation to participation in activities specific to the DTP model or cohort). This suggests that these respondents as a group may not be ‘typical’ other PhD students in the same disciplinary range, although they do display a greater range of study periods and domiciles than the DTP respondents. However, it could be that they represent a sub-sample who are particularly strongly engaged with their institution, fellow students and training opportunities.

It would be useful to identify a more robust control group in any future evaluation work in order to make comparative assessments through survey work, in addition to comparisons of specific outcomes that could be possible from DLHE or similar data where comparison of DTP graduate outcomes could be made with those of a contemporaneous ‘average’ PhD graduate in a similar broad subject area.

4.7. Other outcomes and issues

On the basis of the evidence available through the evaluation process at this point, a number of other outcomes and observations are worthy of note.

One unintended consequence of participation in a DTP appeared to be that different departments within some large universities were now communicating more about PhD training than they had done previously. This they regarded as quite a significant positive outcome. More broadly, during the interviews there was evidence of increased interaction levels between the partners within a DTP, which were not limited to the working specifically of the DTP, so this was again regarded as an unintended benefit.

Survey responses indicated that certain strong individuals, who could be in either senior or administrative level roles, could personally be pivotal to the functioning and success of a DTP partnership. It will be important for institutions to ensure that delivery of the DTP is built into their longer-term strategies and succession planning.

Finally, a number of survey respondents commented that, while they generally welcomed the amount of feedback invited from students, the survey questionnaire used in the evaluation was long and requested that any future surveys could be shorter.

\(^5\) CRAC analysis of HESA Destinations data for 2013/14 doctoral graduates
5. Emerging findings and recommendations

5.1. Evaluation findings in relation to the success criteria

Research excellence:

- Overall, the evidence available suggests that all the organisations involved in the DTPs have excellent research environments and researchers, and that the DTP partners themselves are producing excellent research. This was assessed in the original DTP proposals and assured by the requirement for the TAB to approve any new partners which are added to a DTP. It therefore seems reasonable to say that the students are being trained within excellent research environments;

- Although it is early in the lifetime of the DTPs, there is already evidence that excellent research is being undertaken, with signs from certain early outputs and perceptions that are consistent with high quality research;

- DTPs are rightly giving student excellence high priority and have been recruiting excellent students. However, on occasion this can mean that they struggle to fill projects within certain remit areas. Rather than compromising on student quality (to fill any remit gaps), it is possible that some remit gaps will continue to exist if DTPs continue to prioritise selection of the best students academically.

Training excellence:

- Most of the DTP students perceive their supervisory teams to be of high calibre scientifically and are receiving regular supervision at an appropriate frequency;

- Most but not all students participate in a Training Needs Analysis (TNA), although not all recognise it as such or understand this terminology, but there is some scope for higher participation still and students do want to participate in this way;

- Most students appear to be in appropriate control of their own training, and are very positive about the subject-specific and transferable skills training being offered and the perceived benefits for them of participating in such training;

- Induction processes have improved between Cohort 1 and Cohort 2 and are now good;

- There is evidence that many students assume that support or training in writing for publication and preparing research outputs is something they would expect from their supervisor rather than from the DTP. It may be that DTPs should more overtly offer and provide this type of training to their students;

- The numerical majority are satisfied with the financial and logistical support that they receive, although some students report that their RTSG is insufficient to cover the costs of their fieldwork, laboratory processes or IT equipment, as well as expenses to participate in conferences and other opportunities;

- Student responses indicate a positive feeling of ‘cohortness’ in terms of perceived integration of students across each DTP cohort and how this brings multiple benefits, including peer support, reduced isolation and broadening of perspectives, and these perceptions are particularly strong amongst those in Cohort 2;
• Non-academic partners most commonly identify high demand for communications skills, especially the ability to explain technical issues, as well as for academic or technical subject knowledge. Many also seek coding or other computing skills for data handling (such as for visualisation), high numeracy including statistics, the ability to synthesise important information from literature or data, and general adaptability. Relatively few of these non-academic partners prioritise creativity or innovation skills, or policy awareness.

• Most students are confident they will have the skills they need for their chosen career, although this proportion is higher amongst those in Cohort 2 than Cohort 1 – it is unclear whether that difference is down to greater enthusiasm of PhD students in their initial year or whether this is due to differences in their training;

• Relatively few students feel that training in their DTP is having an impact on their career intentions, with the majority continuing to seek an academic career long-term – some reported in interviews that more overt training around career options and awareness early in the PhD could be valuable.

Multidisciplinary training environment:

• A substantial proportion of DTP students are not aware of the key partner organisations in their DTP and a significant minority see little benefit in their involvement (while a minority of academic supervisors are also not fully bought into the DTP partnership-based training model);

• Students report great enjoyment and value from interacting with other students across their own DTP and other cohorts, potentially more so than the value they perceive they will obtain from interacting with other partners such as end-user organisations. One of the reported benefits of cohort training is gaining wider and interdisciplinary perspectives from other students;

• Training within a cohort, or within a partnership environment, was not reported by students to have been a major factor in their rationale when students applied for their PhD;

• At the point of this evaluation, few students have spent time with non-academic partners, but those who have done so have found it highly beneficial to their project and their personal development, and that the supervision they had there was good;

• Fewer than half of the students who were not on CASE studentships reported that they expected to spend time with an end-user organisation during their PhD, and few students other than those undertaking CASE projects have a designated non-academic supervisor;

• There is a sense that many non-academic partners are strongly engaged with individual DTP students and projects (such as providing supervision of a CASE student, or hosting a placement), whereas at the DTP level it is only a few that are engaged (such as helping to provide wider training) and many are not engaged much at all;

• Overall, non-academic partners do not seem to be used very widely in the delivery of transferable skills training;

• There was evidence from institutions that reaching the requirement for 30% of studentships to be CASE was challenging, although the feedback from those participating
in CASE studentships was particularly positive about the benefits of their interactions with the end-user organisation;

- There was no evidence at this stage that any one of the DTP models or partnership structures implemented is more effective than others, or preferred by students.

**Excellent students:**

- High-calibre students have been attracted to and are being trained in the DTP cohorts, but at the recruitment stage institutions are not reporting consistency in relation to whether to prioritise academic excellence or some other combination of attributes and achievements that might constitute the ‘best fit’ for a student to train in a DTP;

- Many DTPs are heavily over-subscribed with applicants and are therefore able to select from many academically strong students. However, there is less competition for some projects, such as in atmospheric or soil science, and especially those requiring high numeracy, because these attract far fewer applicants, and few from highly numerate physical science, engineering or mathematical backgrounds, whereas field-based and biological projects tend to attract a surfeit of students of very high academic calibre;

- Not all students claim that they understood the DTP model when they were obtaining information about the opportunity and were recruited, and not all are convinced of the value of the inherent wider range of training and opportunities now as they do not see these as relevant to their own research and envisaged academic career trajectory. This suggests that the DTPs are attracting many high-achieving and narrowly- (i.e. academically-) focused students as well as those seeking a broad training programme;

- The vast majority of current students would recommend the DTP model to those considering a PhD and cite far more benefits of it than disadvantages, including positive impacts in terms of social interactions, peer and professional support, access to more and wider training opportunities, and broadening of scientific perspectives. Most of the relatively few areas of criticism appeared to be from those who are very narrowly focused on their research as a stepping stone to an academic career, and see wider training as an unnecessary distraction.

- Very few of the DTP students were studying part-time, which demonstrates that the extent to which a DTP model can be sufficiently flexible for part-time students needs to be considered. Such flexibility is generally to be welcomed if there are aspirations to widen participation in PhD study.

**Quality assurance:**

- Overall, most DTPs are running well although there seems to be somewhat patchy engagement of non-academic partners – some are highly engaged and provide either supervision or training or are hosting placements, while many appear not to be actively engaged;

- There are good quality assurance procedures around supervision and especially inviting student feedback at many stages of the training programme;
• There were noteworthy examples of students mentioning the value of the support they receive from DTP staff, including administrative staff, as well as the opportunity to interact with high-calibre researchers in partner institutions;

• Perceptions of how integrated the partnerships are seem to be very varied – many of the non-academic partners are not involved in decision-making and although the majority think this is appropriate to their circumstances, some do not think it is appropriate (a small number suspect that they were in the DTP proposals purely as 'window dressing');

• Not all supervisors in the lead organisations or academic partners are fully bought-in to the value of the DTP model.

Producing success stories:

• This mid-point evaluation is before any PhD programmes have been completed by students and is therefore strictly too early for observation of genuine outcomes, but there are many positive perceptions and anticipations of success, although clearer measures of what constitutes success (and how to assess this against any potential control group) would be useful.

5.2. Overall assessment and recommendations

Our interpretation at this interim stage is that, overall, the DTP mechanism is working and providing valuable training to the participating students. Evidence from the students and DTP partners suggests that the training being delivered has benefits over that available through the traditional 'algorithm' mechanism of PhD training. This suggests that DTPs as a PhD training delivery model or mechanism should be continued and supported by NERC.

Based on the evidence available, the 15 DTPs within this scheme are running well, and being managed quite well in most respects, and delivering a wide and valuable range of subject-specific and transferable skills training to high-calibre PhD students who will produce high-quality research. There are also clear signs of improvement in some aspects of delivery to students in Cohort 2 compared with Cohort 1.

In detail, there are some issues in a number of DTPs around how meaningfully some of the non-academic partners (i.e. end-user organisations) are engaged and whether their potential contributions are valued by participants or being utilised. There is scope for improvement in that area of DTP management, including the potential for external advisory input for each DTP (in addition to its management committee) which could involve end-user partners.

There is also scope for more incremental enhancements in terms of improved consistency of delivery, embedding the DTP model in institutions for sustainability, and to the level of understanding and commitment of students and academics to the DTP model and its potential value to all career trajectories.

5.3. Recommendations

• The highest-level recommendation is that as the DTP model appears to be working, it should continue to be supported by NERC as a PhD training delivery mechanism, beyond the lifetime of the current scheme (and the current DTP awards should continue for their planned duration).
• PhD students training within a DTP participate in a wider range of types of training than traditionally available to their counterparts who are trained through the algorithm method, and this benefit is appreciated by the students, confirming that the key elements of the DTP model including embedded transferable skills training and interactions with a range of partners should be maintained.

• Not all students thought that they had taken part in a Training Needs Analysis (TNA) exercise, although it seems highly likely that others had done so and not realised that it was a TNA. DTPs should ensure that all students have a TNA and are aware that they have had it, or at the very least have adequate opportunities to discuss their training needs and the opportunities available to them, from the outset of their PhD.

• There was some evidence that relatively few students were benefiting from the opportunities in a DTP programme to undertake structured reflection on their future career options and/or other career learning. We recommend that more overt career training is provided early in the programme and that any cohorts of students that have already passed this stage and not had that opportunity should be given a further opportunity at a later stage.

• Student survey respondents identified a range of substantial benefits from interactions that involved students across the range of DTP cohorts, particularly through engagement with their peers. Particular benefit was reported in being able to interact with others within their research area but in other DTPs; students appeared to value such peer engagement as or more highly than engagement with partners within their own DTP. We recommend that DTPs maximise, within reason, opportunities for students to develop networks of peer support and gain multi-disciplinary perspectives from other students during inter-cohort activities across the range of DTPs.

• Although the perceptions from most DTP students, DTP lead organisations and partner organisations were largely very positive, there was some evidence of certain inconsistencies (in comments responding to open-ended questions and during interviews). These were not fundamental but gave the impression of some inconsistency between certain DTP and institutional requirements in relation to certain aspects of participation, such as whether particular elements of training were voluntary or compulsory. Some students were uneasy about different levels of participation in some training elements. Greater consistency in promotion and implementation of aspects of the training programme, and for that matter embedding the partnership training model in HE institutions, could be beneficial. To clarify students’ and supervisors’ expectations and responsibilities, we recommend the development of brief handbooks for both students and supervisors to specify and clarify NERC’s expectations of each party and improve consistency.

• To some extent the same applied to levels of understanding about CASE studentships, as not all CASE students realised they were CASE students or understood the requirements of a CASE studentship. We recommend that DTPs and supervisors make sure that CASE studentships are meeting the minimum requirements and that students are fully aware of what a CASE studentship involves.

• More effort seems to be needed to inspire DTP students and their host research organisations to engage fully with non-academic partners (end-user organisations), as not all are convinced that they will benefit from such interactions. A significant number appear to think that engagement with an end-user organisation will not benefit them
directly in terms of completing their research project, or that their research has no end-user or policy relevance, or that it will not benefit them personally in the longer term as they expect to pursue an academic career. This suggests limited recognition of the potential value of external interactions and for whom they could be impactful. Given that those students who have spent time with a non-academic partner report that is has been very beneficial to them, we recommend development of student-focused case studies and other measures which demonstrate the impact of non-academic partner interactions on success in PhD projects as well as on career learning (for an academic research or other trajectory).

• The majority of end-user organisation partners responding to the survey reported that they were engaged in ways and an extent that was appropriate for them, but a significant minority did not feel integrated in the partnership and that their lack of involvement in decisions was inappropriate. There is clearly end-user engagement within many DTPs at the individual project or supervisor level, which benefits an individual student. However, engagement with the DTP as a whole was less which suggests that improvements are needed to DTPs’ approaches to the interaction with end-user organisations in delivering wider training and improving visibility to end users.

• In order to involve end-user organisations more in DTP management and decision-making (where such non-academic partners want to be involved), we recommend that DTPs develop a formal mechanism through which to seek external input from end-users (for example through an advisory board) into training- and management-related decisions.

• In order to make more robust assessment of the long-term impact of training in a DTP environment, it would be helpful for NERC or Research Councils UK to devise and agree a range of outcome measures for students and alumni, and also to define an appropriate control group of PhD students. It would also be valuable for host institutions to identify that a PhD student has been trained in a DTP in their HESA student record (by utilising a specific ‘project flag’ in the record) to enable their identification in any future analysis using administrative data.