



Bloodhound Education Programme

Independent Audit of Activities

Final Report

November 2009



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Executive Summary

This report presents the findings from an Independent Audit of Activities of the Bloodhound Education Programme (BEP), undertaken by the National Foundation for Educational Research (NFER). Research for the Audit was undertaken during the period from July to November 2009.

1. The Bloodhound Education Programme

The Bloodhound Engineering Project is a four-year project which aims to design and build a super sonic car (SSC) that will break the world land speed record. It was launched in October 2008 and is now in its second year. A separate education programme called the 'Bloodhound Education Programme' (BEP), which was launched at the same time, is linked to the engineering project. The BEP provides pupils from primary and secondary school, through to students in further and higher education, with the opportunity to engage with the Bloodhound Engineering Project with the aim of inspiring the next generation of scientists and engineers.

The BEP consists of various components aimed at the different education levels and the community more broadly. Educational institutions can register to take advantage of specially developed Bloodhound SSC-themed classroom experiments and exercises. 'Bloodhound Ambassadors' have been recruited and trained to deliver Bloodhound-themed resources to pupils and students in the classroom or to present BEP materials at events.

In addition, the BEP has engaged with an array of delivery partners (referred to throughout as 'partner organisations') which are providing Bloodhound SSC-themed materials, activities, challenges and awards. Partner organisations engaged by the BEP include:

- Primary Engineer
- Engineering Explained
- Greenpower
- F1 in Schools, and
- Young Engineers.

The BEP is working towards the establishment of the Bloodhound Education Centre, which will showcase the building of the Bloodhound SSC to pupils and students, as well as providing practical activities and workshops.

A small team of staff operate the BEP, and form part of the Bloodhound Engineering Project overall team. The team is led by the Education Programme Director. The majority of staff working for the BEP are not employed on a full-time basis. The BEP has no physical headquarters and many of the staff work from home. The establishment of the Bloodhound Education Centre will, in future, provide a focal point for the BEP.

The BEP has received start-up funding of £615,000 from the Department for Children, Schools and Families (DCSF). Additional ‘in kind’ support and equipment has been provided by private sponsors such as Intel and Promethean. As mentioned previously, the BEP was launched in October 2008 at the same time as the Bloodhound SSC project. While the final DCSF funding for the BEP was drawn down by the Royal Academy of Engineering in September 2009, there is an understanding that delivery will occur up until July 2010. Of the funds provided from the DCSF, £100,000 has been allocated to the establishment of the Bloodhound Education Centre. Some of this funding has also been allocated to specific partner organisations, to support the development and delivery of Bloodhound-themed resources and activities. These amounts are between £5,000 and £56,000 and allocations depend on the nature, scope and scale of the resources and activities being developed and delivered.

2. Aims

The Royal Academy of Engineering commissioned the National Foundation for Educational Research (NFER) to carry out an Independent Audit of Activities for the Bloodhound Education Programme. The research was predominantly concerned with establishing the level of participation in those areas of the programme that were operational, and examining the progress of those components still in the planning stage.

The aims of the Audit were to explore:

- the level of usage to date of the educational section of the Bloodhound website and curriculum resource materials, in addition to the scale and scope of these materials
- progress towards the establishment of the Bloodhound Education Centre, including emerging plans for this venue to host STEM-focused events such as master-classes, workshops and curriculum-based school visits, and

- the participation levels, coverage and plans for the marketing of the range of Bloodhound-themed activities, materials and events, many of which are being developed and implemented in partnership with other organisations such as Primary Engineer, Young Engineers, Engineering Explained (a component of Science Made Simple), Greenpower, and F1 in Schools.

3. Methodology

The Audit included the following activities:

- desk analysis of planning and monitoring data provided by the BEP
- interviews with six key BEP staff
- interviews with staff from six partner organisations
- interviews with two school teachers (one primary and the other secondary) and one college lecturer who have actively engaged with the BEP
- observations of school students undertaking Bloodhound-themed activities, and
- a discussion workshop with BEP staff and stakeholder representatives where NFER researchers presented emerging findings.

4. Progress to Date

Table 1 provides an overview of the progress that has been made to date (end of November 2009) across the various components of the BEP.

Table 1

Component of BEP	Progress Made
Registrations to join the BEP	<ul style="list-style-type: none"> - A total of 2606 individuals have registered to join the BEP. - 873 different secondary schools have registered, which is substantially more than the target of 550 secondary schools for the year. - 1024 primary schools have joined which falls considerably short of the target of 2300 primary schools.
Provision of online materials	<ul style="list-style-type: none"> - 22 downloadable 'lesson ideas' are available online, as well as a 'design your own Bloodhound SSC' interactive quiz.
Bloodhound Ambassadors	<ul style="list-style-type: none"> - 119 people have expressed interest in becoming a Bloodhound Ambassador. - 37 of these have been fully trained and checked by STEMNET. A further 35 are undergoing the CRB checking process. - 23 '1K Club' Ambassadors have attended an array of events such as Manchester Science Festival and Imagineering Science Fair in Warwickshire. - Bloodhound-themed activities are being trialed by some STEM

	<p>Ambassador contract holders as part of the induction process for STEM Ambassadors.</p> <ul style="list-style-type: none"> - A virtual toolkit has been developed for Bloodhound Ambassadors containing a video, outlines for classroom activities and guidance for Ambassadors in contacting schools.
Web and media presence	<ul style="list-style-type: none"> - The Bloodhound Engineering Project website is consistently receiving more than 1300 hits per month with it receiving as many as 3500 hits in some months. In November 2009, the website received more than 6000 hits due to the media interest surrounding the announcement of the locations for the build site of the Bloodhound SSC and the record attempt. - The educational component of the Bloodhound Engineering Project has received considerable media attention, both in the UK and abroad.
Bloodhound Education Centre	<ul style="list-style-type: none"> - Locations at Bristol have been secured for building the car (the Maritime Heritage Centre) and the education centre (the Create Centre). They are 0.8 miles apart. - The Create Centre will not incur rent for the duration of the project. - The education centre will be used to run and facilitate practical exercises and workshops.

Table 2 provides an overview of the progress that has been made by partner organisations to date (end of November 2009) in developing and delivering BEP materials and themed activities.

Table 2

Organisation	Progress Made
Young Engineers	<ul style="list-style-type: none"> - The 'Junior Engineer for Britain Bloodhound SSC K'NEX Challenge' was delivered by Young Engineers during 2009. - Each stage of the challenge contained a Bloodhound-related theme. - The challenge was undertaken by 58,026 primary school pupils from 1,573 primary schools. - This academic year, Young Engineers will deliver the 'Cool Racers' programme, in partnership with the BEP, subject to funding.
Primary Engineer	<ul style="list-style-type: none"> - Bloodhound-themed interactive whiteboard classroom resources for primary pupils have been piloted and finalised and began roll out from September 2009. - Accredited CPD, linked to the resources, is being offered to teachers through the National Science Learning Centre Network and Primary Engineer. - No explicit targets for delivery had been set at the time of the Audit but these were being formulated.
Greenpower	<ul style="list-style-type: none"> - The BEP is sponsoring a prize for the 'fastest lap' at each of the 11 race days in 2009. - The BEP team has attended most of the races to date, staffing the Bloodhound SSC stand and speaking with people about the BEP. - Next year, the prize will be awarded to the team with the most

	innovative approach to safety.
F1 in Schools	<ul style="list-style-type: none"> - The Bloodhound SSC Class has been created, representing a simplified class of vehicle, with fewer design constraints. - The Class was opened to schools in April/May 2009. - Regional events including the Bloodhound SSC Class commenced in November 2009.
Engineering Explained	<ul style="list-style-type: none"> - A Bloodhound-themed workshop for pupils and students in years 5-8 has been developed and piloted and began roll out from October 2009. - Targets for workshops in 2009/10 are to run: <ul style="list-style-type: none"> ▪ 6 workshops at science festivals ▪ workshops at 45 secondary schools with feeder primaries ▪ 20 workshops at the Bloodhound Education Centre¹.

Table 3 provides an overview of the progress that has been made by the BEP team to date (end of November 2009) in exploring and developing further opportunities for partnership working.

Table 3

Partner Organisation	Progress Made
STEMNET	<ul style="list-style-type: none"> - The BEP has developed good relationships with some STEMNET Regional Directors and sub-regional STEM brokerage and STEM Ambassador contract holders. The establishment of these relationships allows the further promotion of the BEP to schools through the sub-regional contract holders. - To support STEMNET's work in identifying schools' level of involvement in STEM enhancement and enrichment activities, the BEP team shares details of the schools that have registered for its programme with STEMNET Regional Directors and sub-regional contractors. - The BEP is also encouraging companies to become involved with the Bloodhound Ambassador scheme. Part of this work includes encouraging STEMNET sub-regional contract holders to promote the Bloodhound Ambassador material to their existing STEM Ambassadors.
Science Learning Centres	<ul style="list-style-type: none"> - A number of Bloodhound-themed teacher/lecturer professional development courses have been developed, including a full day course and several one hour sessions. As at the middle of November 2009, there had been a total of ten deliveries of these courses.
Employers	<ul style="list-style-type: none"> - The BEP team is developing close links with some major employers, such as Intel, to support the promotion and delivery of Bloodhound. - Some employers whose work is commercially sensitive are keen to engage in the Ambassador programme using Bloodhound resources.

¹ Some of these workshops may be delivered within schools rather than at the Bloodhound Education Centre.

Initial teacher training	<ul style="list-style-type: none"> - The BEP team is having initial discussions with two teacher training institutions which are interested in using Bloodhound materials and resources with trainee teachers. - The BEP team is receiving requests from individuals undertaking teacher training who are keen to use Bloodhound materials during their teaching practice.
Universities	<ul style="list-style-type: none"> - The BEP team is considering running residential courses for year 10 and 12 students at universities where Bloodhound already has a major presence.
The STEM Cohesion Programme and other government initiatives	<ul style="list-style-type: none"> - The BEP team is investigating how it can link more closely to national programmes, particularly those being delivered by the DCSF and falling within the STEM Cohesion Programme, including the Science and Maths campaign (science and maths: see where they can take you); the Careers Awareness Timeline; and the recently published information, advice and guidance (IAG) strategy for young people.

5. What is Working Well

Interviews with BEP team members and partner organisation representatives have revealed areas of the BEP that are perceived to be working well. These areas of strength relate both to effective delivery of materials and activities, and effective structures and systems of the programme.

Additionally, two teachers and one college lecturer were identified by the BEP as early adopters of programme materials. Interviews with these individuals have identified emerging impacts upon pupils/students and schools/colleges which are likely to be more widely experienced as the programme expands.

The aspects of the BEP which are perceived to be particular strengths are highlighted below.

Quantity and Breadth of Activity in the First Year

A considerable quantity of activities and materials has been delivered in the initial 12 months of the programme. More than 1900 schools and colleges have registered for the BEP to date (end of November 2009). These registrations have been driven through the attendance of the BEP team at events, festivals and schools/colleges; the activities of partner organisations; and through the media and online presence generated by the project. The development of the Bloodhound Ambassador network, as well as resources to support the Ambassadors, is another area showing impressive progress. Links are also being forged with STEMNET Ambassador sub-regional contract holders to encourage their STEM Ambassadors to make use of Bloodhound materials and resources.

The breadth of activity within the BEP has been a key strength of the programme. The engagement of partner organisations has enabled a greater array of materials and activities to be developed than would have been possible using just the small BEP team.

Synergies from Partnership Working

Interviewees were enthusiastic about the BEP's approach of using existing organisations and networks to deliver Bloodhound-themed materials. They reported that the BEP is able to provide the engaging concept and real-world context of the Bloodhound SSC, while partner organisations can provide well developed structures, expertise, networks and access to educational institutions.

Interviewees from partner organisations were enthusiastic about the congruence in objectives between the BEP and their projects. Some of the interviewees commented that there is considerable 'goodwill' towards the BEP because partners have a strong belief in the project.

Bloodhound Providing a 'Hook'

Some interviewees expressed enthusiasm regarding the BEP providing a 'hook' on which a variety of lessons and exercises could be developed and delivered. Through using examples of the actual challenges facing the Bloodhound engineering team, lessons could be constructed that approached these challenges in a cross-disciplinary manner. One teacher commented that this approach gave rise to the opportunity to 'teach STEM by stealth'. Aspects of scientific enquiry, such as measuring, testing and refining can be undertaken by students, without them labelling such activities as 'science'.

An interviewee from one of the partner organisations noted that the vivid context provided by the Bloodhound Engineering Project made it easier for some primary students to grasp more complex constructs, such as scales and ratios.

For some schools and colleges, Bloodhound has encouraged their initial engagement in STEM enhancement and enrichment activities and the intention is that an initial positive experience will lead them onto further involvement. To encourage further involvement, the Bloodhound website provides information on other STEM initiatives and events that schools and colleges might want to participate in. The Bloodhound team is also working closely with key partners and networks within the STEM arena (see Table 3) – such as STEMNET and the Science Learning Centre Network – to support schools' and colleges' further engagement in STEM activities.

Enthusiasm of Pupils and Students

Two teachers, a college lecturer and BEP staff have reported that pupils' and students' reactions to BEP activities have most commonly been enthusiasm and excitement. One teacher reported that, following a BEP event, there was a 'definite buzz' among the students. One college lecturer reported that the BEP had helped to change students' perceptions of engineering as being 'dull'.

Evidence of Raised Aspirations of Pupils and Students

One teacher reported raised career aspirations resulting from the school's involvement with the BEP. An example was provided of a young girl who experienced raised career aspirations: *'One of the girls wanted to be a hairdresser and beauty therapist. She's now looking at chemical engineering - making the makeup'*. The BEP team reports receiving similar feedback on raised aspirations whilst attending events such as science festivals and undertaking visits to schools and colleges. A BEP team member reported that a parent had emailed to say that her nine year-old daughter had become enthusiastic about becoming an engineer since attending a presentation at a science festival in Manchester.

Participation and Inclusion

Discussions with the two teachers and lecturer identified increased inclusion and participation in STEM as emerging impacts of the BEP. A primary teacher observed that the school's engineering club had experienced significant growth, and had slightly more girls than boys.

6. Challenges

A number of challenges have also been identified. The fast pace in which the BEP has been conceived, developed and rolled out is a factor underpinning many of these challenges. Another area of challenge, common to many STEM initiatives, is ensuring that a range of educational institutions and young people engage in the programme. This includes encouraging participation from different types of institution (primary and secondary schools, sixth form and FE colleges and educational institutions with different levels of attainment and located within different socio-economic contexts) and from young people of different ages and genders and from different social, ethnic and cultural backgrounds.

Areas identified as presenting challenges to the BEP are highlighted below.

The Fast Pace of Establishment

The fast pace of establishment of the BEP has meant that staff are stretched in terms of workload. This is further exacerbated by most posts being part-time. According to some BEP team members, stretched resources in terms of time and staffing have led to a feeling that the work can be ‘frantic’ and staff are sometimes just ‘fire fighting’, attending to whatever need is most urgent from day to day.

Comments from two partner organisations have confirmed this assessment. They have sometimes experienced difficulties in communicating with the BEP, which they recognise may have stemmed from the fact that it has only recently been established and the small core team have experienced significant demands on their time. They have commented that it has sometimes been difficult to get timely information or approval for decisions.

Formalisation of Systems

Conscious of the rapid growth of the programme in its short lifetime, BEP staff members have acknowledged the need for more formalisation of systems (for example monitoring and evaluation) to underpin further growth of the BEP. The establishment of the Bloodhound Education Centre should provide a natural ‘base’ of activities for the BEP, and will hopefully reduce the travel burden on BEP staff.

Two partner organisations have also identified the need for more clearly developed systems. It has been commented that more formalisation in the agreements between their organisations and the BEP would be helpful. One partner organisation has also suggested that a more consistent policy for the promotion of partner organisations on the BEP website would be beneficial.

While a need for further formalisation of systems and processes has been identified, it has been commented that, as the programme grows further, care will need to be taken to ensure that the introduction of more formalised systems does not overly inhibit the ‘entrepreneurial’ ethos and culture of the BEP or over-burden partners.

Promoting Gender Inclusiveness

BEP team members report that some stakeholders within schools and colleges and existing STEM networks hold the perception that the BEP is not gender inclusive. They report that such stakeholders mistakenly consider the BEP as an example of ‘boys and their toys’. BEP team members fervently maintain that this is not the case, citing the prominent female role-models within the BEP team, and the Bloodhound engineering team. The BEP team is working hard to link in with existing organisations which tackle

gender stereotypes and encourage young girls/women to consider engineering. It is also running activities specifically targeted at young girls/women and is in the process of developing policies on equality and diversity.

Timeframes of the Bloodhound Engineering Programme

The biggest appeal for the Bloodhound SSC will naturally occur whilst it represents cutting edge engineering, real-time problem solving, and the excitement that is created by the uncertainty around breaking the world land speed record. It will be desirable to maximise the delivery of resources and activities during the limited time-period before the attempt at the world land speed record. Those developing the programme are also considering strategies for ensuring the continued relevance and appeal of its activities and resources, after an attempt has been made.

Equality of Access

Like many STEM programmes, the schools and colleges most likely to engage with the BEP are those which are well resourced and whose teachers and lecturers are proactive in promoting STEM engagement and enrichment activities. The challenge for those responsible for the BEP is to develop and implement strategies to reach a more representative population of educational institutions, including those which are ‘hard-to-reach’ and have not participated in STEM engagement and enrichment activities previously. In addition, more work is required to reach the target set for primary schools registering with the programme. Discussions with BEP team members reveal that they are exploring a range of strategies to reach a more diverse audience.

7. Monitoring and Evaluation

Interviews with the BEP team and partner organisations have sought information on monitoring and evaluation practices. Details of internal practices and those of partners are highlighted below.

Existing Monitoring and Evaluation Arrangements: BEP

There are currently basic arrangements in place for the monitoring and evaluation of BEP activities. The BEP team understands that more sophisticated monitoring and evaluation will increasingly become necessary in order to demonstrate the impact of the programme, and identify areas of strength, or opportunities for improvement.

Information from those individuals registering for the BEP is stored in a spreadsheet. For individuals registering on behalf of an educational institution, details on: institution type (primary or secondary school, sixth form/FE college); state or independent sector; gender intake (mixed/girls only/boys only); and government office region are collected. Details on Bloodhound Ambassadors are stored in a separate spreadsheet. This source contains various details on Ambassadors including contact details and progress towards becoming registered.

Data is available on the number of visits to the Bloodhound Engineering Project website, using Google Analytics software. This allows reporting on the number of visitors to the various pages of the website, along with average times visitors remain on the page and what country visitors are from.

Existing Monitoring and Evaluation Arrangements: Partner Organisations

The monitoring data that each partner organisation collects varies by organisation, as appropriate to the nature and type of activity that they deliver. In each case, data is being gathered according to the standard practices of each organisation. No BEP specific data is being collected at this stage. Some interviewees have indicated that they would be happy to share data with the BEP or to ask questions on the Bloodhound-specific theme of their activities.

Opportunities for Improved Monitoring and Evaluation

Ideas for improved monitoring and evaluation have been put forward by interviewees, both from within the BEP team and from partner organisations. Some of these suggestions, along with suggestions from the research team, are presented below:

- more **gender monitoring** and analysis could be undertaken and the **characteristics of the educational institutions involved in the BEP could be explored**. If this proved possible, linking the schools involved in the BEP to the STEMNET escalator would provide information on schools' prior involvement in STEM enhancement and enrichment activities and would enable the BEP to assess how far it is engaging with 'hard to reach' and less STEM-engaged schools
- a **standardised and short feedback form** could be developed for pupils/students and implemented by Bloodhound Ambassadors, BEP staff, teachers/lecturers and partner organisation staff as appropriate. A similarly simple form could also be devised for teachers/lecturers
- a small number of **standardised questions** could be developed. These questions could be a subset of the standardised feedback form mentioned above. Selected questions could be incorporated into existing feedback forms of partner organisations, as appropriate

- **Bloodhound Ambassadors could be used as ‘eyes and ears’ for the BEP.** Bloodhound Ambassadors could be encouraged to informally explore the level of engagement with the BEP at the schools they visit
- a more formalised **system of reporting for BLD Ambassadors** could be considered. For example, Ambassadors could be asked to fill out a basic proforma for each interaction they have with a school. This might include information on the location of the school, the number of participating pupils/students and their level/age ranges, and which activity was delivered
- opportunities for **tracking the number of downloads from the BEP website** could be explored. Teachers/lecturers and other registrants already enter log-in details to download materials. Closer scrutiny of these downloads would allow an assessment of what types of institutions are downloading which resources and the popularity of different types of resources. There may also be an opportunity to gather data from teachers/lecturers and other registrants at the point of download, or when they re-visit the site, through a pop-up question
- Engineering Explained will be collecting a large amount of data from students through an ARS questionnaire. It is keen for the BEP to **have some input into the questions that are asked of students**, and
- there currently exists some separation within the BEP’s existing monitoring and tracking arrangements. For example, the tracking spreadsheet for educational institutions is separate from the Bloodhound Ambassador spreadsheet. More effective monitoring could be achieved by **centralising and combining these spreadsheets** into a searchable database.

It would also be beneficial for the BEP team to develop some good practice case studies of schools and colleges whose staff and pupils/students have gained significant benefits from their involvement with the BEP. This could include some schools where young girls/women have been particularly impacted by the programme. In the longer-term, it would also be worth considering following up a sample of institutions and pupils/students involved in the programme to establish longer-term impacts.

In discussing future monitoring and evaluation arrangements with partners, the BEP will need to give attention to the data already collected and arrangements will need to be customised to each partner. Care will need to be taken to ensure that partners do not feel over-burdened.

8. Concluding Comments

In the short time since the launch of the Bloodhound Education Programme, the BEP team has made good progress in developing and implementing the various aspects of the programme. The considerable numbers of educational institutions and other organisations (such as scout groups) registered for the programme, and the development of the Bloodhound Ambassador network, represent solid achievements. The online presence of

the BEP is strong, and it benefits from a prominent position on the broader Bloodhound Engineering Project website.

Equally, the partnerships between the BEP and partner organisations responsible for delivering Bloodhound-themed activities, resources and materials have developed effectively. The Bloodhound team has also worked hard to develop wider partnerships with other key organisations providing STEM enhancement and enrichment opportunities and teacher professional development, such as STEMNET and the Science Learning Centre Network.

Throughout the research, many interviewees have been very enthusiastic about the BEP. Its innovative approach to providing activities, resources and materials through partner organisations is seen as a key strength of the programme. Through using this approach, it has been possible to take advantage of both the excitement generated by the Bloodhound concept, and the expertise of existing networks and programmes.

The greatest challenges faced to date have been primarily related to the quick establishment and roll out of the BEP. Tight timeframes and large workloads have stretched BEP team members at times. As the programme develops, the team might want to consider developing more formal systems and processes. This could include developing more formal agreements with partners and setting out clear monitoring and evaluation requirements. However, while BEP staff have acknowledged that formalising their systems and processes will be important, they have also identified that the flexible and ‘entrepreneurial’ ethos of the organisation is key to its success. Maintaining a balance between these factors, in addition to limiting the burden placed on partners, will be important challenges for the BEP team over the coming months.

In relation to monitoring, the gathering of data is currently occurring at a basic level. The programme will benefit from more focus on collecting data about the characteristics of the educational institutions and young people engaging with the programme. This knowledge will aid the BEP’s continued efforts to increase the participation of primary schools and less STEM-engaged schools in the programme and will support the drive to ensure that young people from different socio-economic and ethnic backgrounds and of different ages and genders, with a particular focus on girls/young women, are engaged in the programme.

In addition, to enable a more rigorous assessment of the programme’s quality and effects to be made, it will be beneficial to develop more robust evaluation systems that capture

satisfaction and impact data from programme participants, deliverers and key stakeholders.

1 Introduction

1.1 The Bloodhound Education Programme

The Bloodhound Engineering Project is a four-year project which aims to design and build a super sonic car (SSC) that will break the world land speed record. It was launched in October 2008 and is now in its second year. A separate education programme called the ‘Bloodhound Education Programme’ (BEP), which was launched at the same time, is linked to the engineering project. The BEP provides pupils from primary and secondary school, through to students in further and higher education, with the opportunity to engage with the Bloodhound Engineering Project with the aim of inspiring the next generation of scientists and engineers.

Chapter two contains further details on the structure and components of the BEP.

1.2 The Independent Audit of Activities

The Royal Academy of Engineering commissioned the National Foundation for Educational Research (NFER) to carry out an Independent Audit of Activities for the Bloodhound Education Programme.

As the BEP is in its early stages, some materials and activities have only recently been implemented, whilst other activities are still in their planning stages. Accordingly, the research, conducted in the period from July to November 2009, was predominantly concerned with establishing the level of participation in those areas of the programme that were operational, and examining the progress of those components still in the planning stage.

1.2.1 Aims

The aims of the Independent Audit of Activities were to explore:

- the level of usage to date of the educational section of the Bloodhound website and curriculum resource materials in addition to the scale and scope of these materials
- progress towards the establishment of the Bloodhound Education Centre, including emerging plans for this venue to host STEM-focused events such as master-classes, workshops and curriculum-based school visits, and

- the participation levels, coverage and plans for the marketing of the range of Bloodhound-themed activities, materials and events, many of which are being developed and implemented in partnership with other organisations such as Primary Engineer, Young Engineers, Engineering Explained (a component of Science Made Simple), Greenpower, and F1 in Schools.

1.2.2 Methodology

The findings are based on:

- desk analysis of planning and monitoring data provided by the BEP
- interviews with six key BEP staff
- interviews with staff from six partner organisations
- interviews with two school teachers (one each from a primary and secondary school) and one college lecturer who have actively engaged with the BEP
- observations of primary school pupils undertaking Bloodhound-themed activities, and
- a discussion workshop with BEP staff and stakeholder representatives where NFER researchers presented emerging findings.

Desk Analysis

Between August and November 2009, the NFER was provided with data and resources that had been collected and compiled by BEP staff. These came from a variety of sources and were held in a number of formats, and included:

- a spreadsheet used to track enrolments onto the BEP
- copies of internal Bloodhound Engineering Project newsletters
- links to online BEP materials, such as lesson ideas
- a spreadsheet used to track the enrolment of Bloodhound Ambassadors
- links to the Bloodhound Ambassador ‘virtual toolkit’, and
- data on visits to the BEP website.

Interviews with Bloodhound Staff

In July and August 2009, an NFER researcher conducted interviews with six key staff members from the BEP team. The interviews were conducted either face-to-face or over the telephone.

Interviewees’ areas of responsibility included:

- overall coordination of the Bloodhound Education Programme
- creation and editing of Bloodhound-themed educational materials for the website
- management of relationships with educational institutions and partner organisations
- management of Bloodhound Ambassadors, and
- updating the Bloodhound Engineering Project website.

The interviews explored areas such as the staff members' role and areas of responsibility, perceptions of progress to date, understanding of monitoring and evaluation arrangements and plans for the future.

Interviews with Staff from Partner Organisations

Between September and November 2009, an NFER researcher spoke with representatives from various organisations which are partnering with the BEP. A total of six interviews were conducted, with representatives from the following organisations:

- Primary Engineer
- Engineering Explained
- Greenpower
- F1 in Schools
- Young Engineers, and
- East Berkshire Education Business Partnership.

These interviews explored each organisation's involvement with BEP, the progress made to date, evaluation and monitoring arrangements and plans for the future.

Interviews with Teachers and a College Lecturer

An NFER researcher spoke with two teachers and a college lecturer during September and October 2009. These individuals were identified by BEP staff as early adopters of the various Bloodhound-themed activities and materials. Through speaking with these teachers and the lecturer, insights were gained into the reception of the BEP at the school/college and individual pupil/student level.

Observations of Pupils and Students Engaging with Bloodhound-themed Activities

In September 2009, an NFER researcher visited two events where pupils and students were undertaking Bloodhound-themed activities.

The first of these events was the national final of the Young Engineers K'NEX Challenge, held at the Imperial War Museum, Duxford. For the K'NEX Challenge, pairs of primary aged children from across the UK used K'NEX building pieces to construct a solution to a Bloodhound-themed engineering problem.

The second event was the National Science Festival at the University of Surrey. This event included the facilitation of Bloodhound-themed workshops by Primary Engineer, as well as a Bloodhound SSC stand where BEP staff spoke with pupils, students and parents about the project.

Emerging Findings Discussion Workshop

In October 2009, NFER researchers facilitated a discussion workshop where the initial findings of the Audit were presented. The eight attendees included three members of the BEP team, representatives from two of the partner organisations, a representative from the Royal Academy of Engineering and two NFER research staff.

In addition to the presentation of findings, discussion sessions were facilitated throughout the workshop. These were designed to ensure that NFER had effectively captured the relevant issues, and that data was as up to date as possible. The discussion sessions also gave BEP staff and partners the opportunity to discuss challenges facing the programme and strategies that might help improve the programme.

1.3 Report Structure

Findings from the study are presented within the following chapters:

Chapter 2. The Bloodhound Education Programme: Background

Chapter 3. Progress to Date: Delivery by Bloodhound Staff

Chapter 4. Progress to Date: Partnership Working

Chapter 5. What is Working Well

Chapter 6. Challenges

Chapter 7. Monitoring and Evaluation

Chapter 8. Concluding Comments.

2 The Bloodhound Education Programme: Background

The BEP was launched in October 2008, with the aim of inspiring the next generation of young people to pursue careers in science, technology, engineering and mathematics (STEM). Those responsible for the project believe that by showcasing how these disciplines can be harnessed to achieve something amazing, young people will be enthused and inspired to consider careers in STEM. Chapter two provides background information on the BEP.

2.1 Components of the Programme

The BEP consists of various components aimed at the different education levels and the community more broadly. Educational institutions can register to take advantage of specially developed Bloodhound super sonic car (SSC)-themed classroom experiments and exercises, while university-level engineering and technology students will be provided with access to real design challenges and test data as the Bloodhound Engineering Project develops.

Furthermore, the Bloodhound Education Programme has engaged with an array of delivery partners which are providing Bloodhound SSC-themed materials, activities, challenges and awards. These partner organisations include:

- Primary Engineer
- Engineering Explained
- Greenpower
- F1 in Schools, and
- Young Engineers.

To date, the majority of workshops and speeches have been presented by the BEP team. They have also promoted the BEP through tending a BEP stand at various outreach events and partner organisation events, such as Greenpower race days. As the programme grows, the increased workload in this area is planned to be taken on by Bloodhound Ambassadors. These are interested individuals who have been trained and equipped to deliver Bloodhound resources to pupils and students. Bloodhound Ambassadors are checked and accredited through STEMNET's STEM Ambassador programme.

The BEP team is working towards the establishment of the Bloodhound Education Centre. It is planned that the centre will provide a focus for BEP activities, allowing pupils and students and teachers and lecturers to visit and observe the ongoing building of the Bloodhound SSC. In addition, there are plans to offer Bloodhound-related practical activities and workshops for pupils and students visiting the centre.

2.2. Staffing

A small team of staff operate the BEP, and form part of the Bloodhound Engineering Project overall team. The team is led by the Education Programme Director.

The majority of staff working for the BEP are not employed on a full-time basis. Some work on a days-per-week basis, while others are engaged on an as-needed basis. Presently, the BEP has no physical headquarters and many of the staff work from home. The establishment of the Bloodhound Education Centre will, in future, provide a focal point for the BEP.

Communication between members of the BEP team and the members of the engineering side of the organisation is aided by the production of a weekly newsletter that provides updates on the different teams' progress.

2.3 Budget

The BEP has received start-up funding of £615,000 from the Department for Children, Schools and Families (DCSF). Additional 'in kind' support and equipment has been provided by private sponsors such as Intel and Promethean. As mentioned previously, the BEP was launched in October 2008 at the same time as the Bloodhound SSC project. While the final DCSF funding for the BEP was drawn down by the Royal Academy of Engineering in September 2009, there is an understanding that delivery will occur up until July 2010. Of the funds provided from the DCSF, £100,000 has been allocated to the establishment of the Bloodhound Education Centre. Some of this funding has also been allocated to specific partner organisations, to support the development and delivery of Bloodhound-themed resources and activities. These amounts are between £5,000 and £56,000 and allocations depend on the nature, scope and scale of the resources and activities being developed and delivered.

3 Progress to Date: Delivery by Bloodhound Staff

Chapter three presents information on the progress of the Bloodhound Education Programme, focussing on those areas being delivered and developed primarily by Bloodhound staff. It explores the numbers of registrations for the BEP; the numbers of visitors to the website; and the level of media coverage achieved by the Bloodhound Engineering Project. This chapter also explores the scale and scope of materials developed by the BEP team for use in the classroom, the recruitment of Bloodhound Ambassadors and the development of supporting resources for Bloodhound Ambassadors. The chapter concludes with an outline of the progress made toward the establishment of the Bloodhound Education Centre.

3.1 Registration for the BEP

Those interested in the Bloodhound Education Programme are asked to register their educational institution or organisation in order to be involved. Registration is free, and entitles the educational institution or organisation to access the Bloodhound teaching resources, regular email updates on the progress of the Bloodhound project and promotional Bloodhound posters and fliers². NFER was provided with details of registrations as at November 2009.

A total of 2606 individual registrations had been received by the Bloodhound team, as at November 2009. The distribution of these registrations is shown in Table 3.1.1

Table 3.1.1: Bloodhound Education Programme: Individual Registrations

From UK Educational Institutions	
Primary	1048
Secondary	1070
FE	98
HE	33
Sub Total	2249
Other registrations ³	357
Total	2606

² The posters and fliers are only for those educational institutions and groups based in the UK.

³ 'Other' registrations include overseas individuals and institutions, individual students, home educators, families, scout groups, youth groups, businesses and other education-related organisations.

Table 3.1.1 reveals that the majority of the registrations were from individuals representing educational institutions. Individuals from primary schools and secondary schools provided an overwhelming majority of those individuals registering for the BEP.

The 'other' category includes non-school groups such as businesses, scout and youth groups. BEP staff reported that some of these groups are beginning to incorporate Bloodhound-themed activities into their work. For example, a BEP team member reported that a scout group that had engaged with the BEP was using Bloodhound materials for young people pursuing their technology badge.

National competitions, such as the K'NEX Challenge, F1 in Schools and Greenpower have provided a rich source of registrations for the Bloodhound Education Programme. By far the biggest recruiter out of these competitions has been the K'NEX Challenge, which accounted for 33 per cent of all registrations for the BEP.

Events have also proved to be a good source of registrations for the BEP. These events have included science festivals, teacher conferences and design and technology shows. Depending on the nature of these events, Bloodhound team members may be responsible for activities such as giving a speech or tending a stand providing information to event attendees.

The Bloodhound website itself has been a large source of registrations. Links to the education component of the Bloodhound Engineering Project are prominently displayed on the front page of the website. (At various times, a half-page banner on the home page has alerted visitors to the educational section.)

The remainder of registrations are sourced through individual contacts with Bloodhound team members.

Table 3.1.2 shows the breakdown of where registrations were sourced from, for those 2249 individuals who represented a UK educational institution.

Table 3.1.2: Sources of Registrations

Source	Percentage
National competition	36
Event	31
Website	26
Individual contact through Bloodhound team member	7
Total	100

The figures above refer to the overall number of registrations by individuals. For a number of educational institutions, more than one member of staff may have registered for the BEP. The table below shows the actual number of unique educational institutions that are represented by registrations for the BEP.

Table 3.1.3: Registrations: Number of Educational Institutions

Type of Educational Institution	Number	Percentage
Primary	1024	51
Secondary	873	43
FE	86	4
HE	27	1
Total:	2010	100⁴

Of these 2,010 educational institutions:

- ninety-three per cent were state funded, while seven per cent were independent, and
- ninety-four per cent had a mixed cohort of students, while a total of six per cent had either a girls-only (three per-cent) or boys-only (three per-cent) intake.

Targets

An interview with a BEP team member revealed that targets had been set for school registrations for the BEP. The initial 12 month target (from October 2008) was to achieve registrations from 10 per cent of primary and secondary schools. This equates to

⁴ Due to rounding, column does not sum to 100%.

approximately 2300 primary schools and 550 secondary schools. Table 3.1.4 shows the progress toward these targets as at November 2009.

Table 3.1.4: School Registrations for the BEP and Progress Towards 12 Month Targets

Type of Educational Institution	Number of Schools (As at November 2009)	12 Month Target	Progress Towards Target
Primary	1024	2300	45%
Secondary	873	550	159%

The target of 550 secondary schools registering for the BEP had already been met and well exceeded by November 2009. The primary school target was proving much harder to achieve at this time.

The Bloodhound team acknowledges that reaching the target of ten per cent of primary schools will require continued effort and recognises that primary schools have traditionally been difficult to engage with STEM initiatives. In addition, staff have commented that the ‘rarely cover’⁵ issue is making engagement with primary schools even more challenging. See Section 6.5 for further discussion.

3.2 Provision of Online Teaching Materials

Once educational institutions or organisations have registered to become part of the BEP, they are entitled to access a series of teaching resources provided on the BEP website. These resources provide teachers, lecturers and other educationalists with ideas for lessons on Bloodhound-related themes. As at November 2009, the site included 11 downloadable lesson ‘ideas’ and an interactive ‘design you own Bloodhound SSC’ multiple choice quiz.

The lesson ideas are not lesson plans as such, but provide a ‘conceptual framework’ for teachers and lecturers to be able to construct appropriate lesson plans around. A member of the BEP team who has been responsible for developing some of these resources

⁵ The aim is to move towards a position where teachers may only be asked to cover rarely was clearly indicated in the National Agreement on Raising Standards and Tackling Workload (2003). In 2007, schools were advised that they should expect to achieve such a position from September 2009.

explained that the material had initially existed in the form of detailed lesson plans, but that they had since been made more conceptual. It was felt that this approach allowed more flexibility for teachers and lecturers to deliver the material in ways that would be appropriate for their particular class or age group.

For each idea, a target age range is suggested, from Key Stage 2 to Key Stage 4. The website also provides an overview of the broad subject areas that each idea fits into, such as mathematics, design and technology, science or geography. The materials provide ideas on an array of activities including:

- constructing a balloon powered car
- using Google Earth to select an appropriate site for the Bloodhound SSC record attempt
- investigating the hardness of a surface
- investigating objects' centre of gravity, and
- velocity, acceleration and associated physiological effects.

Information provided for teachers/lecturers in the resources includes instructions for any practical work involved with the activity and examples of questions to stimulate pupils' and students' interest. Some activities also contain examples linking the challenges highlighted in the activity with the real engineering challenges faced by the Bloodhound engineering team.

Discussions with a member of the BEP team revealed that it is assumed that people register for the BEP with the chief aim of making use of these downloadable resources as registration needs to take place before downloading. However, data is not currently available on the number of times that particular resources have been downloaded which would enable the team to assess their popularity and what resources seem to be particularly valued. In addition, data on log-in frequencies is not available. In the future, the Bloodhound team will be moving to a new web provider and will ensure that this data is routinely collected.

In terms of the future development of the BEP section of the Bloodhound Engineering Project website, consideration is being given to having separate areas of the website targeted at primary schools; secondary schools and sixth form/FE colleges; higher education institutions; and employers.

3.3 Bloodhound Ambassadors

This section will outline the progress made towards implementing systems for the management of Bloodhound Ambassadors, including systems for their recruitment, training and coordination. Ambassadors represent a key component of the BEP, as it is expected that they will increasingly take on a more prominent role in presenting Bloodhound-themed materials and representing Bloodhound at events as the project expands.

3.3.1 Recruitment and Training

The Bloodhound Education Programme is beginning to engage with ‘Bloodhound Ambassadors’ in order to provide a mechanism for the delivery of Bloodhound-themed enrichment activities within schools. Additionally, these Ambassadors provide a resource for helping with other delivery mechanisms such as attendance at events where the BEP has a presence, such as science festivals.

The Bloodhound Ambassador programme has been established so that the Ambassadors are part of the STEM Ambassador programme, operated by STEMNET. Taking advantage of this existing structure means that Bloodhound Ambassadors have access to established support systems, while schools can be assured that appropriate safeguards, such as CRB checking, are in place.

As well as recruiting and supporting designated ‘Bloodhound’ Ambassadors, the BEP team is also keen to engage STEMNET Ambassadors more generally in the promotion of Bloodhound-themed materials and activities; it is now developing links with STEMNET Regional Directors and STEMNET Ambassador sub-regional contract holders. In the North East, a STEM contract holder has enquired whether some of the region’s existing STEM Ambassadors could become Bloodhound Ambassadors with the aim that they can then use the Bloodhound resources and materials when they engage with schools. The Bloodhound team has also been invited to present Bloodhound at the induction of new STEM Ambassadors in South Yorkshire.

One member of the BEP team has taken on the role of coordinating Bloodhound Ambassadors. This role includes a variety of tasks such as: completing the original scoping research that underpins the Bloodhound Ambassador scheme; monitoring and tracking the recruitment of Ambassadors; induction and support of Ambassadors; and the development of resources for the Ambassadors to use.

In November 2009, NFER was provided with the figures from the spreadsheet that is currently being used to track Bloodhound Ambassadors. This spreadsheet includes information on Ambassadors' contact details, availability, existing experience and progress in registering to become an Ambassador. At this time, 119 people had expressed some level of interest in becoming a Bloodhound Ambassador. Of these:

- thirty-seven were fully trained and inducted Ambassadors, checked by STEMNET
- thirty-five were undertaking the process of training and induction or registration and CRB checking through STEMNET, and
- the remaining individuals had been provided with information about how to become a Bloodhound Ambassador, and were considering whether to register.

In addition to Bloodhound Ambassadors, interested members of the Bloodhound SSC supporters club, the '1K Club', have helped out at various events and science festivals. As at the end of November 2009, a total of 23 club members had helped the team at events such as the Manchester Science Festival and the Imagineering Science Fair in Warwickshire.

3.3.2 The Virtual Toolkit of Resources

A 'virtual toolkit' has been developed for Bloodhound Ambassadors. This toolkit consists of a variety of resources that can be downloaded and used as a guide for presentations to school children. The toolkit includes the following:

- **the 'main' Bloodhound presentation**, outlining the attempt to break the world land speed record. The presentation includes PowerPoint slides and a video. A quiz for teams of students to complete at the end of the presentation is also included
- **outlines for five different activities**. These include activities such as the 'speed of sound' experiment and a poster design exercise. For each of the activities, there are PowerPoint slides as well as notes for the presenters. Other resources, such as video footage or information sheets are included for activities, as appropriate. Three of the activities are designed to be adaptable for 'all age' groups, while the remaining two are designated for use with secondary students
- **guidance for contacting schools** and contact details of Bloodhound staff, should further information or support be required, and
- a **request for data and ideas**. Bloodhound Ambassadors are requested to let the Bloodhound team know each time they interact with a school and are also encouraged to suggest ideas for additional resources, or other ways to enthuse pupils/students or support teachers.

On request, Ambassadors are provided with a list of Bloodhound registered schools in their area once they are ready to start engaging with schools.

3.3.3 Plans for the Future

Discussions with the BEP staff member responsible for the Bloodhound Ambassador scheme revealed that the target was to have 250 registered Bloodhound Ambassadors by July 2010.

As well as plans for growth in the number of Bloodhound Ambassadors, there are plans for improvements to the systems supporting the Ambassadors. These include:⁶

- improvements to the information gathered by Bloodhound Ambassadors, for example by providing details and feedback on each of the sessions they deliver
- improvements to the recruitment and support of Bloodhound Ambassadors, including improved email communication and monitoring data, and
- improvements to the virtual toolkit, including further exercises and the development of a physical resources pack to leave behind.

3.4 Exposure: Web and Media Presence

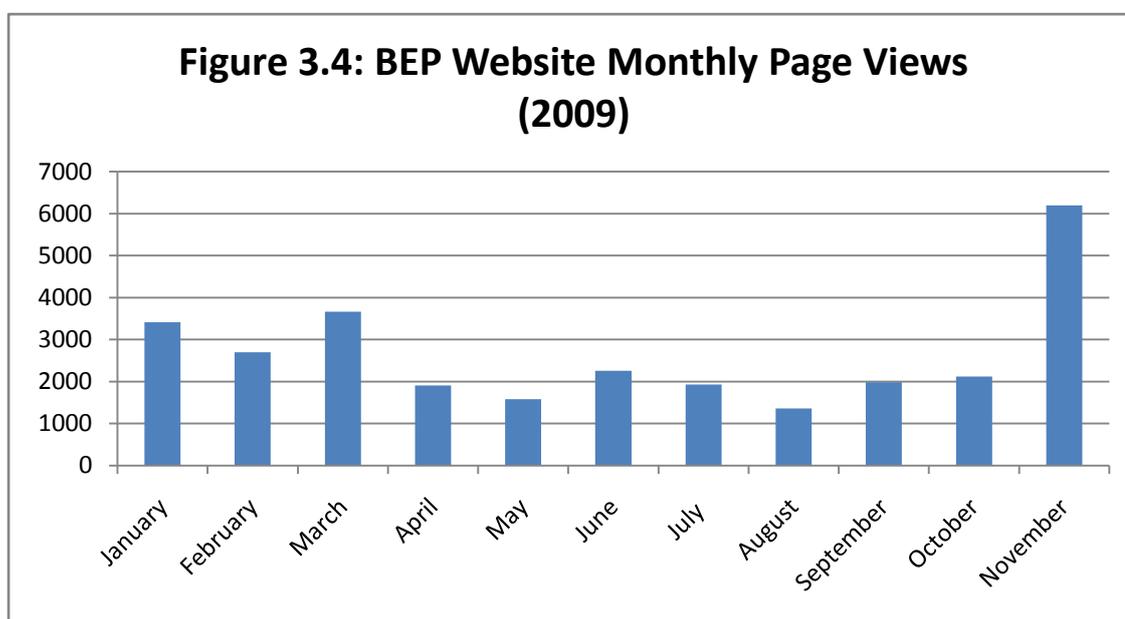
The Bloodhound Education Programme website is a prominent component of the broader Bloodhound Engineering Project website. It contains:

- information on how to register to become involved with the Bloodhound Education Programme
- downloadable ideas for teachers, lecturers and other educationalists (these can only be accessed once registration has taken place)
- details of Bloodhound-themed programmes and activities being offered by partner organisations, and
- further information on the Bloodhound vehicle and video content addressing some of the specific engineering challenges associated with the project.

Data regarding visits to the Bloodhound Education Programme pages of the website has been provided to the NFER research team. Figure 3.4 displays the number of monthly visitors to the main Bloodhound Education Programme page in 2009. While the number of visits per month has varied throughout year, the education component of the site has still been visited more than 1,300 times each month, even over the summer period, and has received over 3,500 visits in some months. The large rise in the number of visits that occurred in November corresponds with the media interest surrounding the announcements of the location for the build site of the Bloodhound SSC and the location for the record attempt.

⁶ Plans sourced from an internal BEP document 'Bloodhound Ambassadors: Vision, Strategy and Action Plan' (July 2009), supplied to the NFER in September 2009.

Of the 29,097 visits to the Bloodhound Education Programme main page in 2009 (up to the 30 November), 20,781 (71 per cent) were from UK computers. Of these, 5,065 were repeat visits to the site.



An area of strength for the Bloodhound Education Programme consistently identified by Bloodhound staff and partner organisations is the ability of the Bloodhound vehicle to capture attention. Bloodhound staff report that the use of striking visual representations of the vehicle is able to immediately capture the imagination of young people. In a promotional video for students, available on the website and provided to Bloodhound Ambassadors, the large and potentially baffling numbers associated with the attempt on the land speed record are contextualised to help younger viewers' understanding. The top speed to be reached by the car is described as 'covering the length of four football pitches per second'.

As well as promoting Bloodhound activities and resources on the website, the site is increasingly being used to inform users about other STEM providers and activities and events that they might want to participate in, such as National Science and Engineering Week, to further their engagement in STEM and to ensure that their engagement is maintained in the longer-term even after the attempt at the world land speed record.

Mission 21, the public relations firm engaged by the Bloodhound Engineering Project report that the Project received the following media coverage in the six months to March 2009:

- more than 200 UK newspaper articles

- more than 135 items of UK broadcast coverage (including repeats)
- more than 550 news articles online
- more than 250 international news online mentions, with 60 international news articles appearing in print, and
- a video on YouTube being viewed more than 110,000 times in the first three months.

Significant media interest has also been achieved in recent months, particularly in November 2009 when announcements were made regarding the locations for the build site and the record attempt.

While much media attention has been paid to the attempt on the world land speed record, the educational component of the project has also received media attention. The Times⁷ reported that *'If all goes to plan, Bloodhound SSC will... inspire thousands of British school children to take science A-levels'*. The Times Educational Supplement⁸ reported on the Bloodhound Engineering Project, saying *'The creators of a car designed to travel faster than a speeding bullet say the project's most important goal will be to help teachers inspire a new generation of scientists'*.

3.5 The Bloodhound Education Centre

The establishment of the Bloodhound Education Centre represents a central component of the BEP. It is planned that the centre will provide a focus for BEP activities, allowing pupils and students and teachers and lecturers to visit and observe the ongoing building of the Bloodhound SSC.

In addition to observing the design and building of the vehicle, it is anticipated that practical sessions and workshops will also be offered to primary and secondary school groups visiting the education centre. For example, Engineering Explained will be delivering up to 20 Bloodhound-themed workshops at the centre during the 2009/10 academic year.

Members of the BEP team emphasised the importance of linking the programmes and activities provided by the education centre to the curriculum and pre-defined educational objectives. They emphasised there was little value in simply providing an unstructured tour of the site. One member of the team also stressed that the education centre would

⁷ The Times, *'1,000mph Burst of Inspiration for A-level Science'*, October 23, 2008, p17.

⁸ The Times Educational Supplement, *'Bullet Car to Rally Next Generation'*, October 24 2008, p24.

work most effectively if activities undertaken at the centre built upon previous work that had been occurring in the classroom.

Discussions with a BEP team member in November revealed that a location in Bristol had been selected as the site for the building of the Bloodhound SSC and that a nearby location (approximately 0.8 miles away) had been selected for the Bloodhound Education Centre. The site secured for the building of the car is the Maritime Heritage Centre for which a small rent has been agreed. A media event to launch the build site took place on 23/24 November 2009. The fifth floor of the 'Create Centre' at Bristol will house the education centre and rent will be free for the duration of the project. Members of the BEP team report that this building is also used as a health and safety centre and regularly attracts visiting Key Stage 2 pupil groups. It is hoped that Bloodhound will be able to capitalise on the existing links with the 300 primary schools that the health and safety centre has already developed.

The BEP are also interested in developing 'satellite' education centres in the future. As at November 2009, discussions with a number of sponsors regarding further locations were underway. These include the W5 Science and Discovery Centre in Belfast and the Imperial War Museum in Duxford.

3.6 Progress to Date: An Overview

Table 3.6.1 outlines the progress that has been made to date (end of November 2009) across the various components of the BEP.

Table 3.6.1: Progress to date: BEP

Component of BEP	Progress Made
Registrations to join the BEP	<ul style="list-style-type: none"> - A total of 2606 individuals have registered to join the BEP. - 873 different secondary schools have registered, which is substantially more than the target of 550 secondary schools for the year. - 1024 primary schools have joined which falls considerably short of the target of 2300 primary schools.
Provision of online materials	<ul style="list-style-type: none"> - 11 downloadable 'lesson ideas' are available online, as well as a 'design your own Bloodhound SSC' interactive quiz.
Bloodhound Ambassadors	<ul style="list-style-type: none"> - 119 people have expressed interest in becoming a Bloodhound Ambassador. - 37 of these have been fully trained and checked by STEMNET. A further 35 are undergoing the CRB checking process.

	<ul style="list-style-type: none"> - 23 '1K Club' Ambassadors have attended an array of events such as Manchester Science Festival and Imagineering Science Fair in Warwickshire. - Bloodhound-themed activities are currently being trialed by some STEM Ambassador contract holders as part of the induction process for STEM Ambassadors. - A virtual toolkit has been developed for Bloodhound Ambassadors, containing a video, outlines for classroom activities and guidance for Ambassadors in contacting schools.
Web and media presence	<ul style="list-style-type: none"> - The Bloodhound Engineering Project website is consistently receiving more than 1300 hits per month with it receiving as many as 3500 hits in some months. In November 2009, the website received more than 6000 hits due to the media interest surrounding the announcement of the locations for the build site of the Bloodhound SSC and the record attempt. - The educational component of the Bloodhound Engineering Project has received considerable media attention, both in the UK and abroad.
Bloodhound Education Centre	<ul style="list-style-type: none"> - Locations at Bristol have been secured for building the car (the Maritime Heritage Centre) and the education centre (the Create Centre). They are 0.8 miles apart. - The Create Centre will not incur rent for the duration of the project. - The education centre will be used to run and facilitate practical exercises and workshops.

4 Progress to Date: Partnership Working

Chapter four describes the partnership working undertaken by the Bloodhound team. Firstly, it discusses the Bloodhound activities that have been delivered through five partner organisations. It then goes on to describe the wider partnerships that are being developed.

4.1 Activities Delivered through Partner Organisations

One of the unique aspects of the BEP is its intention to work within the framework of STEM providers which are already established, have a proven track record, and have expertise in their particular fields. Section 4.1 outlines the relationships that Bloodhound has developed with various existing organisations, including describing the Bloodhound-themed materials and activities that these partners are delivering, targets for implementation and plans for the future.

4.1.1 Young Engineers

Young Engineers is an organisation, established for more than 30 years, which aims to ‘inspire young people to develop an interest in engineering, and, in doing so, recognise the importance and excitement of engineering as a future career’. This aim is pursued through a large portfolio of activities, including the provision of competitions and a national network of engineering clubs. An interviewee from Young Engineers estimated that more than 100,000 children are reached through the various Young Engineers activities that are delivered each year.

The K’NEX Challenge has been run by Young Engineers since 2001. It is targeted at primary school pupils in years four to six. Pupils work in pairs to design and build, using K’NEX materials, solutions to engineering problems. The K’NEX Challenge is run firstly at a school level. Winners from the school level challenges advance through to county finals, government regional finals and, finally, a national final.

The K’NEX Challenge is delivered at a local level through a network of 40 contract holders. These contract holders may be STEMNET sub-regional contract holders, or they may be interested individuals. Contract holders will often work with a team to deliver the K’NEX Challenge at the school level and it is common for these teams to include STEM Ambassadors.

Young Engineers' Involvement with the BEP

In 2009, the BEP, along with two other organisations formed a consortium with Young Engineers to deliver the 'Junior Engineer for Britain Bloodhound SSC K'NEX Challenge'. The BEP's involvement in the K'NEX Challenge was to provide the theme for this year's challenge and to provide £10,000 of funding. Members of the BEP were also involved in attending some of the challenge events at the county final and national final level.

Each of the stages of the 2009 K'NEX Challenge had a Bloodhound-themed re-engineering problem. The first stage of the K'NEX Challenge, delivered in schools, involved designing and building a Bloodhound vehicle. The problems increased in complexity throughout subsequent stages. The final problem at the national final involved designing and building a solution to respond to the challenge of turning the Bloodhound vehicle at the end of its first run, in readiness for its second pass.

Targets and Evaluation

The interviewee from Young Engineers reported that members of the consortium delivering the K'NEX Challenge had set a target for the Challenge to reach 40,000 pupils in 2009. This initial target has been exceeded by almost 50 per cent.

Current figures regarding involvement with the 2009 K'NEX Challenge reveal that 58,026 pupils have been involved, representing 1,573 primary schools. These figures are likely to increase further, as two contract holders are yet to report their attendance figures.

The interviewee from Young Engineers emphasised that monitoring and evaluation was a priority for the organisation. As Young Engineers receives its funding from industry and sponsors, showing evidence of value and efficiency is crucial.

In the case of the K'NEX Challenge, the 40 regional contractors report back to Young Engineers with details of participation in the challenge. These reporting details include basic details of the schools involved, numbers attending and a gender breakdown. Some contractors also provide additional qualitative data on how well the challenges have worked, which are usually very positive.

The interviewee from Young Engineers stressed that the relationship with the local contractors has been based on goodwill, and that the financial rewards for delivering the K'NEX Challenge were not large. Because of this, Young Engineers is hesitant to

increase the scope and scale of the monitoring data collected by contractors, as it would cause an increase in the administrative burden placed on these organisations.

The Future

The BEP's initial involvement in the K'NEX Challenge was on a one-year basis, and this has now concluded. Next year's challenge will have a different theme. This is standard practice for the K'NEX Challenge: each year a new theme is carefully chosen with the aim of linking with the curriculum, and being accessible to a full range of primary-aged pupils.

Young Engineers will launch the 'Cool Racers' competition in November 2009 with sponsorship from the BEP. The competition will run until July 2010. The Cool Racers competition will involve groups of primary school pupils designing and building a kinetically powered vehicle within a one hour time limit. The vehicles will be raced over a three metre course.

Beyond the Cool Racers project, Young Engineers currently has no formal plans for further engagement with the BEP. However, the representative interviewed commented that Young Engineers would be happy to undertake further work in partnership with the BEP if areas could be found that provided mutual benefit to both organisations.

4.1.2 Primary Engineer

The vision for Primary Engineer is that 'girls and boys from a very early age will aspire to becoming designers and makers: the engineers and scientists of the future'⁹. Primary Engineer pursues this vision through providing CPD courses and interactive classroom resources for primary teachers.

Primary Engineer's CPD courses for primary teachers are delivered through a network of 43 regional centres. These regional centres are predominantly secondary schools, although a smaller number are museums, industrial venues or universities. The CPD courses are compatible with the Teacher Learning Academy (TLA) framework for professional recognition and are listed on the Training and Development Agency for Schools (TDA) CPD database.

Classroom materials are provided by Primary Engineer, in the form of interactive whiteboard resources, printable books and lesson plans. These resources are mapped to

⁹ www.primaryengineer.com/index.php, viewed 15/10/2009

the primary curriculum, and incorporate mathematics, science, ICT and design and technology elements through practical projects. An interviewee from Primary Engineer stressed that links to the curriculum were an important aspect of the resources, as this meant they are inclusive of all pupils. They are not ‘enrichment’ activities, which may only be appropriate for interested or gifted pupils.

An interviewee from Primary Engineer reported that the organisation had currently reached around 600 schools with its range of materials and that this was set to increase substantially in the coming year. A marketing campaign has been planned to promote the new Bloodhound-themed Primary Engineer materials to those schools already involved with Primary Engineer.

Primary Engineer’s Involvement with the BEP

Primary Engineer is involved in the BEP through providing Bloodhound-themed classroom resources. An interviewee from Primary Engineer explained that the partnership made sense for both organisations. Primary Engineer has had extensive experience in developing materials for use in the classroom, while the BEP can provide a ‘real life context’ that is essential.

Through developing classroom resources using a Bloodhound theme, Primary Engineer has stayed within its area of existing activity and expertise. The key target groups, as well as the intended impacts, remain the same as for other Primary Engineer activities: primary aged children are encouraged to become ‘designers and makers’ through the provision of practically-based classroom materials linked with the curriculum.

The Bloodhound-themed resources developed by Primary Engineer are designed to be undertaken over half a term. They follow the design process for creating a vehicle and include initial research, designing, manufacturing, testing and evaluating. The resources include:

- software and interactive lessons (including 120 pages of material)
- lesson plans with notes
- children’s work books
- digital ‘flip charts’ for students, allowing them to store a digital record of their work, and
- comprehensive elements of mathematics and science.

An interviewee from Primary Engineer reported that the materials included content related to design and technology, mathematics and science, as well as some geography and careers information.

The Bloodhound-themed resources were piloted in a number of primary schools in the summer term of 2009. At the time of the interview with the Primary Engineer representative (early September 2009), final adjustments were being made to the resources in response to feedback obtained through piloting.

The Bloodhound-themed Primary Engineer resources are being launched during the 2009-10 academic year. The interviewee mentioned that one school planned to run the content across the whole school, in order to enthuse pupils about the materials.

The interviewee from Primary Engineer explained that it will also provide training in the use of the Bloodhound-themed classroom resources. This will begin in January 2010, after being piloted in Lancashire. It is intended that the training will be accredited towards teachers' CPD requirements through the TLA.

Targets and Evaluation

The interviewee from Primary Engineer reported that a marketing professional has recently been engaged by Primary Engineer. Discussions are taking place with this professional to determine appropriate targets for the coming year, and strategies to ensure that such targets are achieved.

The Primary Engineer interviewee reported that evaluation is undertaken when teachers are involved with the CPD component of Primary Engineer's activities. This evaluation is designed to be compliant with the CPD code of practice, specified by the TDA. The evaluation includes an assessment of the extent to which pre-course objectives have been met and of the quality of the training on the day in addition to a follow-up some months later to explore how the CPD has impacted upon classroom practice.

The Future

The Primary Engineer interviewee identified a number of new Bloodhound-themed initiatives and programme components that Primary Engineer will explore over the coming year. These include:

- the creation of a resources pack for Bloodhound Ambassadors, based around building and testing a simple vehicle, that can be taken into primary schools

- the creation of Bloodhound-themed CAD/CAM resources and a mathematics master-class as part of a wider programme of mathematics master-classes
- the creation of an SEN version of the Bloodhound-themed classroom resources, and
- the development of a family activity book.

4.1.3 Greenpower

Greenpower is an organisation that has been established for ten years. Its purpose is to promote engineering to primary, secondary and further education pupils and students through the designing, building and racing of an electric car.

In the primary section of the competition, the cars are based on a standardised kit. For the secondary and further education competitions, just the motor and power source are standardised, leaving teams with greater autonomy in designing the vehicle.

Greenpower's Involvement with the BEP

Greenpower has incorporated a partnership with the BEP within the context of the existing competition. This is achieved through the BEP sponsoring a prize for the fastest lap at each Greenpower event in the F24 class, which is for secondary students.

In addition to sponsoring a prize, BEP representatives are involved in Greenpower race events through tending a stand providing information on the Bloodhound Engineering Project.

Targets and Evaluation

An interviewee from Greenpower (September 2009) reported that 11 Greenpower events will be run throughout the year, and that they are currently half way through the season. Representatives from the BEP have been present at 'most' of the events.

Greenpower collects attendance data based upon numbers of students, year group and gender breakdown and would be happy to share this data with the BEP.

The Future

The interviewee from Greenpower commented that there was a slight misalignment of emphases in the current arrangements, as Greenpower does not emphasise speed in the way that BEP does, focussing instead on engineering and endurance. In response to this, the BEP-sponsored prize next year will be for the team with the most innovative approach

to safety. The interviewee reported that Ron Ayers, the well known aerodynamicist from the Bloodhound Engineering Project, will take on a more active role with Greenpower next year, including judging some of the designs.

The interviewee expressed enthusiasm about the future partnership between the BEP and Greenpower, saying *'It's a good time to get people excited about engineering'*.

4.1.4 F1 in Schools

The aim of F1 in Schools is *'to help change perceptions of engineering, science and technology by creating a fun and exciting learning environment for young people to develop an informed view about careers in engineering, Formula One, science, marketing and technology'*.¹⁰

This aim is pursued through teams of three to six students planning, designing, testing and manufacturing a vehicle to be raced along a 20 metre straight. Teams compete regionally, nationally and internationally.

F1 in Schools' Involvement with the BEP

F1 in Schools has partnered with the BEP by creating a new class within competitions, known as the 'Bloodhound SSC Class'. The rules for this class of racing have been simplified, so there are fewer restrictions on the type of vehicle that can be created.

Registration for the Bloodhound SSC Class started in April/May 2009. Schools have been designing and working on their projects since then. The first of the regional finals containing the Bloodhound SSC Class began in November 2009.

The interviewee from F1 in Schools was enthusiastic about the partnership between the organisation and the BEP. The interviewee reported that the relationship with the BEP had been smooth and easy to maintain. It was noted that this was made easy due to the similar objectives of the organisations.

Targets and Evaluation

The interviewee from F1 in Schools reported that there were over 100 schools registered for the Bloodhound SSC Class from England. Sometimes, schools will enter more than one team.

¹⁰ <http://www.f1inschools.co.uk/page--the-f1-in-schools-challenge.html> viewed 22/10/2009

The interviewee reported that the main target for F1 in Schools is to achieve year-on-year growth in the number of schools involved. It was emphasised that the programme is not for elite schools, there are participating schools from ‘right across the board’.

F1 in Schools collects data based on the schools registering for the different event classes. In addition to this, anecdotal data is gathered on race days, through members of the F1 in Schools team holding informal discussions with students and teachers.

The Future

The interviewee from F1 in Schools stated that it would be beneficial to see more joint communications from F1 in Schools and the BEP and that it would be desirable to raise the level of publicity for the Bloodhound SSC Class.

In addition, the interviewee felt that it would be helpful to have representatives from the BEP at as many of the regional events as possible, once the Bloodhound SSC Class races have commenced.

4.1.5 Engineering Explained

Engineering Explained (EE) is a project within ‘Science Made Simple’ that delivers engineering workshops to school-aged children. The broader mission of Science Made Simple is to ‘inspire the next generation of scientists and engineers’, engage the public and popular culture with science and engineering and to be a ‘translation service’ between researchers and the public.¹¹

The target audience for EE is children from primary school to A-level age. EE produces the content for a variety of different workshops that are presented in schools to appropriate year groups.

Engineering Explained’s Involvement with the BEP

An interviewee from EE identified that EE and the BEP shared the same objective, which is to promote engineering to young people. It is this congruence of objectives that initially drew EE to become involved with the BEP.

EE has partnered with the BEP to develop a Bloodhound-themed workshop for pupils and students in years five to eight. This provides another example of how an established

¹¹ <http://www.sciencemadesimple.co.uk/> viewed 15/10/2009

organisation is incorporating aspects of the Bloodhound project into its existing programme delivery. The aims of the workshop, the style of delivery and the target group are similar to those of the other workshops that EE delivers.

An interview with an EE representative (mid-September 2009) revealed that piloting of the Bloodhound-themed workshop had been completed, and that delivery of the workshops was just about to commence rolling out. The first workshops took place in October 2009.

EE is offering secondary schools a full day of workshops, during which three sessions can be run. Secondary schools are being encouraged to invite their feeder primary schools to at least one of the workshops. This will allow the target age range of years five to eight to be reached without the need to travel to a large number of smaller schools. The BEP is heavily subsidising the cost of the workshops for schools which take part.

Targets and Evaluation

A representative from EE outlined the following targets for the 2009/10 academic year for the Bloodhound-themed workshops:

- 6 workshops to be facilitated at science festivals (2 of these have already been completed)
- presentation of the workshop at 45 secondary schools (as these schools are encouraged to invite feeder primary schools, the actual number of schools reached will be considerably higher), and
- 20 workshops to be facilitated at the Bloodhound Education Centre (some of these workshops may now be delivered within schools).

The workshops are to be presented at locations across England.

An interviewee from EE reported that they had not received guidance from the BEP on suggested targets for the workshops in terms of a breakdown between rural/urban areas, independent/maintained schools or gender mix. In the absence of such guidance, EE was endeavouring to deliver the workshop to a wide range of schools. The interviewee mentioned that independent schools tend to be more proactive in booking workshops, so attention needed to be paid in order to ensure an appropriate representation of all school types.

EE gathers extensive evaluation data to assess the effectiveness and impacts of its workshops. Attendance data, including gender split and breakdown by year group or key stage, is collected for all workshops.

Questionnaire data is also collected from every workshop. A sample of approximately 20 pupils/students is selected from each workshop¹² to complete a questionnaire covering topics such as perceptions of engineering before and after the workshop, and level of positive attitudes towards engineering. This questionnaire data is collected using electronic ‘Audience Response System’ voting handsets, on which students wirelessly key in their answers. The EE interviewee reported that collecting data using this method was easier than traditional paper questionnaires as children enjoyed providing the responses in this way and the data was easy to collate.

The EE interviewee reported that the BEP would be welcome to input into the questions asked of students. These could potentially include some Bloodhound-specific questions.

The Future

The interviewee from EE commented that the Bloodhound workshop was currently only funded to be delivered throughout England. It was felt that it would be desirable if funding could be sourced to expand the delivery of the workshop to include Scotland, Wales and Northern Ireland.

The development of further Bloodhound-themed workshops for different audiences was also raised as a potential development for the future. These might include, for example, a workshop for GCSE level students, or those undertaking BTEC engineering study.

4.1.6 Partner Organisation Progress to Date: Overview

Table 4.1.6 provides an overview of the progress that has been made by partner organisations to date (end of November 2009) in developing and delivering BEP materials and themed activities.

¹² Engineering Explained plan to use this method of data collection after each workshop. They intend to deliver workshops at 45 schools, delivering three workshops per visit to each school. This yields a potential 2700 questionnaire responses this academic year.

Table 4.1.6: Progress to Date: Partner Organisations

Organisation	Progress Made
Young Engineers	<ul style="list-style-type: none"> - The 'Junior Engineer for Britain Bloodhound SSC K'NEX Challenge' was delivered by Young Engineers during 2009. - Each stage of the challenge contained a Bloodhound-related theme. - The challenge was undertaken by 58,026 primary school pupils from 1,573 primary schools. - This academic year, Young Engineers will deliver the 'Cool Racers' programme, in partnership with the BEP, subject to funding.
Primary Engineer	<ul style="list-style-type: none"> - Bloodhound-themed interactive whiteboard classroom resources for primary pupils have been piloted and finalised and began roll out from September 2009. - Accredited CPD, linked to the resources, is being offered to teachers through the National Science Learning Centre Network and Primary Engineer. - No explicit targets for delivery had been set at the time of the Audit but these were being formulated.
Greenpower	<ul style="list-style-type: none"> - The BEP is sponsoring a prize for the 'fastest lap' at each of the 11 race days in 2009. - The BEP team has attended most of the races to date, staffing the Bloodhound SSC stand and speaking with people about the BEP. - Next year, the prize will be awarded to the team with the most innovative approach to safety.
F1 in Schools	<ul style="list-style-type: none"> - The Bloodhound SSC Class has been created, representing a simplified class of vehicle, with fewer design constraints. - The Class was opened to schools in April/May 2009. - Regional events including the Bloodhound SSC Class commenced in November 2009.
Engineering Explained	<ul style="list-style-type: none"> - A Bloodhound-themed workshop for pupils and students in years 5-8 has been developed and piloted and began roll out from October 2009. - Targets for workshops in 2009/10 are to run: <ul style="list-style-type: none"> ▪ 6 workshops at science festivals ▪ workshops at 45 secondary schools with feeder primaries ▪ 20 workshops at the Bloodhound Education Centre¹³.

4.2 Wider Partnerships

As well as partnering with key organisations which are delivering Bloodhound-themed activities, the Bloodhound team is also working closely with other key partners and networks within the STEM arena to support educational institutions' further engagement in STEM activities.

¹³ Some of these workshops may be delivered within schools rather than at the Bloodhound Education Centre.

The following section will outline the development of the BEP's relationships with these partners and networks. They include:

- STEMNET
- the Science Learning Centre (SLC) Network
- employers
- initial teacher training providers
- universities
- the STEM Cohesion Programme and other related government initiatives.

The BEP team is also looking to engage with other partners and networks during the life of the project.

4.2.1 STEMNET

The BEP has developed good relationships with some STEMNET Regional Directors and sub-regional brokerage and STEM Ambassador contract holders. The establishment of these relationships allows the further promotion of the BEP to schools through the sub-regional contract holders. The BEP team member responsible for managing these relationships has reported that it has been important to develop personal relationships with STEMNET regional staff and sub-regional contactors for partnership working to be effective. As a result, the BEP's strategy is to continue its efforts to make personal contacts with STEMNET Regional Directors and sub-regional contractors, which will support the promotion of the BEP.

To support STEMNET's work in identifying schools' level of involvement in STEM enhancement and enrichment activities, the BEP team shares details of the schools that have registered for its programme with STEMNET Regional Directors and sub-regional contractors. The BEP team is also requesting feedback from Regional Directors and sub-regional contractors as to where the schools that it is working with are on the STEM escalator so that it can assess whether it is working with schools that are already engaged in STEM enhancement and enrichment activities or schools which are newly engaged through Bloodhound.

The BEP team is also encouraging companies to become involved with the Bloodhound Ambassador scheme. Part of this role includes encouraging STEMNET STEM Ambassador contract holders to promote the Bloodhound Ambassador material to their

existing STEM Ambassadors. Individual STEMNET sub-regional contract holders have begun to show an interest in the Bloodhound Ambassador scheme with one contract holder in the North East requesting that its STEM Ambassadors become Bloodhound Ambassadors and thereby have access to the Bloodhound resources and materials available. The Bloodhound team has also been invited to make a presentation about Bloodhound at the induction of new STEM Ambassadors in South Yorkshire.

4.2.2 Science Learning Centre (SLC) Network

A number of Bloodhound-themed teacher/lecturer professional development courses have been developed, including a full day course and several one hour sessions. As at the middle of November 2009, there had been a total of ten deliveries of these courses. The courses had been delivered at various locations including Manchester, London, Aylesbury, Oxford, Southampton and Sandwich. The BEP team member responsible for the development of the CPD courses explained that they provide a good example of using a cross-disciplinary approach to STEM, and fit neatly into the ‘STEM subjects working together’ module offered by the Science Learning Centre Network. This BEP team member plans to continue delivering the Bloodhound professional development course in the South East and also to offer it to the wider SLC Network.

4.2.3 Employers

The BEP team is developing close links with some major employers to support the promotion and delivery of Bloodhound. As mentioned earlier, some employers whose work is commercially sensitive are keen to engage in the Ambassador programme using Bloodhound resources. The Bloodhound team is also developing relationships with STEMNET STEM Ambassador contract holders to encourage their Ambassadors’ use of the Bloodhound materials and resources (see 4.2.1 above). In addition, the Engineering and Technology Board has made use of Bloodhound materials for its Ambassador induction training. Discussions are also ongoing with the National Physics Laboratory which may be interested in using Bloodhound material with Ambassadors due to the work of some Ambassadors’ companies being commercially sensitive.

The BEP is also exploring a potential partnership with Intel which will be piloting the use of its ‘classmate’ laptops with schools and their pupils/students in Liverpool. It is hoping that the Bloodhound Primary Engineer materials might be showcased on the laptops.

The BEP has also made links with Protocol National which recruits lecturing staff for further education colleges. They featured Bloodhound at the Association of Colleges Annual Conference and Exhibition on 17-19 November 2009 which they sponsored.

4.2.4 Initial Teacher Training

The BEP team is having initial discussions with a PGCE tutor at the University of Worcester who is interested in using Bloodhound materials and resources with trainee teachers. The intention is that they will use them in the classroom when they are on their teaching placement. Discussions are also underway with a professor at the University of the West of England regarding PGCE students specialising in primary using Bloodhound materials during teaching practice. Bloodhound materials may also be used at an event in Keele which will be run next year in which PGCE students will work with year 8 students. The BEP team is also receiving requests from individuals undertaking teacher training who are keen to use Bloodhound materials during their teaching practice. The Bloodhound team is keen to make further links with teacher training courses.

4.2.5 Universities

The BEP team is considering running residential courses for year 10 and 12 students at universities where Bloodhound already has a major presence and staff are currently in discussions with Swansea University to run a residential there in the summer of 2010. The course will run over five days and will be open to 100 young people located across the UK. It is intended that young graduates from companies involved in the Bloodhound Ambassador scheme and other sponsor companies will act as tutors/supervisors. The residential will be funded through the BEP and sponsorship will also be sought.

4.2.6 STEM Cohesion Programme and Other Related Government Initiatives

The BEP team is also investigating how it can link more closely to national programmes, particularly those being delivered by the DCSF and falling within the STEM Cohesion Programme, including the Science and Maths campaign (science and maths: see where they can take you); the Careers Awareness Timeline; and the recently published information, advice and guidance (IAG) strategy for young people¹⁴. As part of the new IAG strategy for young people, the Department is trialing career-related learning at Key

¹⁴ Quality, Choice and Aspiration A strategy for young people's information, advice and guidance, DCSF, October 2009

Stage 2 in 38 primary schools in seven local authorities – Bristol, Coventry, Gateshead, Manchester, Plymouth, Reading and York. The pathfinder schools are in the most in socio-economically disadvantaged areas, and the trial will run from October 2009 until July 2010. The programme aims to broaden horizons and raise aspirations of Key Stage 2 pupils by challenging the negative stereotyping that means some children from deprived backgrounds believe that universities and certain careers are out of reach. The BEP team would like to work with these 38 schools and use BEP resources to engage and enthuse pupils in relation to engineering and STEM more generally.

4.2.7 Wider Partnerships Progress to Date: Overview

Table 4.2.7 provides an overview of the progress that has been made by the BEP team to date (end of November 2009) in exploring and developing further opportunities for partnership working. As mentioned above, the BEP team are also looking to engage with other partners and networks during the life of the project.

Table 4.2.7: Progress to Date: Wider Partnerships

Partner Organisation	Progress Made
STEMNET	<ul style="list-style-type: none"> - The BEP has developed good relationships with some STEMNET Regional Directors and sub-regional STEM brokerage and STEM Ambassador contract holders. The establishment of these relationships allows the further promotion of the BEP to schools through the sub-regional contract holders. - To support STEMNET's work in identifying schools' level of involvement in STEM enhancement and enrichment activities, the BEP team shares details of the schools that have registered for its programme with STEMNET Regional Directors and sub-regional contractors. - The BEP is also encouraging companies to become involved with the Bloodhound Ambassador scheme. Part of this work includes encouraging STEMNET sub-regional contract holders to promote the Bloodhound Ambassador material to their existing STEM Ambassadors.
Science Learning Centres	<ul style="list-style-type: none"> - A number of Bloodhound-themed teacher/lecturer professional development courses have been developed, including a full day course and several one hour sessions. As at the middle of November 2009, there had been a total of ten deliveries of these courses.
Employers	<ul style="list-style-type: none"> - The BEP team is developing close links with some major employers, such as Intel, to support the promotion and delivery of Bloodhound. - Some employers whose work is commercially sensitive are keen to engage in the Ambassador programme using Bloodhound resources.
Initial teacher	<ul style="list-style-type: none"> - The BEP team is having initial discussions with two teacher training institutions which are interested in using Bloodhound

training	<p>materials and resources with trainee teachers.</p> <ul style="list-style-type: none"> - The BEP team is receiving requests from individuals undertaking teacher training who are keen to use Bloodhound materials during their teaching practice.
Universities	<ul style="list-style-type: none"> - The BEP team is considering running residential courses for year 10 and 12 students at universities where Bloodhound already has a major presence.
The STEM Cohesion Programme and other government initiatives	<ul style="list-style-type: none"> - The BEP team is investigating how it can link more closely to national programmes, particularly those being delivered by the DCSF and falling within the STEM Cohesion Programme, including the Science and Maths campaign (science and maths: see where they can take you); the Careers Awareness Timeline; and the recently published information, advice and guidance (IAG) strategy for young people.

5 What is Working Well

Chapter five outlines areas of the BEP that interviewees have identified as working effectively. These include areas that BEP staff have been delivering where considerable progress has been made. Both BEP staff and partner organisation staff identified strengths of the BEP related to the iconic nature of the SSC and the innovative ways in which the programme is being delivered through partner organisations.

At the time when the research was being carried out, some of the partner organisations were in the process of finalising and piloting resources and materials to be rolled out during the 2009/10 academic year. A fuller picture of how well these activities have been received will become available over coming months.

This chapter also incorporates details of the emerging impacts of the BEP on pupils/students and schools/colleges that were identified by two teachers and a lecturer. Whilst the impact data presented is based upon interviews with a small number of interviewees who were early adopters of Bloodhound-themed materials, the emerging impacts identified are likely to be more widely experienced as the programme expands. Future evaluations of the BEP will provide the opportunity to gather more extensive and robust data on impacts upon pupils/students and schools/colleges.

5.1 Quantity and Breadth of Activity in the First Year

Interviews with BEP staff have revealed that a considerable quantity of activities and materials has been delivered in the initial 12 months of the BEP. More than 1900 schools and colleges have registered for the BEP to date (end of November 2009). These registrations have been driven through the attendance of the BEP team at events, festivals and schools/colleges; the activities of partner organisations; and through the media and online presence generated by the project.

The development of the Bloodhound Ambassador scheme, as well as resources to support the Ambassadors, is another area showing impressive progress. Designated Bloodhound Ambassadors have been, and are being, recruited and links are also being made with existing STEMNET Ambassadors who are being encouraged to make use of the Bloodhound materials. At the discussion workshop, a BEP staff member also reported that a number of companies have been attracted to the Bloodhound Ambassador scheme since it provides their employees with materials and resources that they can use in schools. Companies working in areas that are commercially sensitive find the resources

appealing because they provide content that can be presented without concern about confidentiality issues.

The breadth of activity within the BEP has been a key strength of the programme. The engagement of partner organisations has enabled a greater array of materials and activities to be developed than would have been possible using just the small BEP team. Through using BEP staff and partner organisations, the BEP has been able to develop and deliver a range of resources that are:

- aimed at primary, secondary and sixth form/FE college target audiences, as well as teachers/lecturers
- linked to the curriculum and also offering enrichment activities, and
- appropriate for presentation by classroom teachers/lecturers, visiting Bloodhound Ambassadors or specialised presenters (such as Engineering Explained).

5.2 Synergies from Partnership Working

Both BEP staff and partner organisation staff were enthusiastic about the BEP's approach of using existing organisations and networks to deliver Bloodhound-themed materials. Interviewees reported that the BEP is able to provide the engaging concept and real-world context of the Bloodhound SSC, while partner organisations provide well developed structures, expertise, networks and access to educational institutions.

Interviewees from partner organisations were enthusiastic about the congruence in objectives between the BEP and their projects. This is largely enabled by the BEP having a wide remit, as one BEP interviewee commented: *'Bloodhound is not necessarily a tick-box organisation. We just have one big box to tick, which is encouraging STEM participation'*.

Interviews with most partner organisations have revealed that there is considerable 'goodwill' towards the BEP and that partners have a strong belief in the project. One interviewee commented that, because of this belief in the BEP, their organisation was willing to 'go the extra' mile in their work with the BEP.

An attendee at the discussion workshop observed that the BEP provided a new model for the delivery of STEM curriculum development and engagement and enrichment activities that saw a range of organisations 'coalesce around a particular theme'. The attendee felt that this model offered a departure from more traditional 'structural' methods of

organising and delivering STEM activities and models which start from scratch rather than build on existing work. This attendee observed that it will be interesting to see, over time, whether this might prove more effective than traditional models.

5.3 Bloodhound Providing a ‘Hook’

Interviewees expressed enthusiasm regarding the BEP providing a ‘hook’ on which a variety of lessons and exercises could be developed and delivered. Through using examples of the actual challenges facing the Bloodhound engineering team, lessons could be constructed that approached these challenges in a cross-disciplinary manner. A secondary school teacher observed that students experiencing Bloodhound-themed resources were beginning to make the connection between the individual STEM subjects, and were starting to see how they linked together within a single project.

One primary teacher commented that this ‘hook’ approach gave rise to the opportunity to ‘*teach STEM by stealth*’. Aspects of scientific enquiry, such as measuring, testing and refining could be undertaken by students, without them labelling such activities as ‘science’. The same teacher reported that one particular student, who had a statement of special needs, was able to perform mathematical tasks much more confidently when engaged in practical tasks associated with the BEP.

An interviewee from one of the partner organisations noted that the ‘vivid’ context provided by the Bloodhound Engineering Project made it easier for primary students to grasp more complex constructs, such as scales and ratios.

In addition, it was commented that Bloodhound has encouraged some schools’ and colleges’ initial engagement in STEM enhancement and enrichment activities and the intention is that an initial positive experience will lead them onto further involvement. To encourage further involvement, the Bloodhound website provides information on other STEM initiatives and events that schools and colleges might want to participate in. The Bloodhound team is also working closely with key partners and networks within the STEM arena – such as STEMNET and the Science Learning Centre Network – to support schools’ and colleges’ further engagement in STEM activities.

5.4 Enthusiasm of Pupils, Students, Teachers and Lecturers

Two teachers, a college lecturer and the BEP team reported that pupils' and students' reactions to BEP activities were most commonly enthusiasm and excitement. One teacher reported that, following a BEP event, there was a '*definite buzz*' among the students. An NFER researcher observed an activity where primary aged pupils were introduced to the BEP through a video. It was noted that the children responded enthusiastically to the presentation and were fully engaged with the practical activity that followed.

A college lecturer reported that the BEP had helped to change students' perceptions of engineering as being 'dull'. Another teacher reported that students were so enthusiastic after attending a BEP activity that they organised a 'family STEM day' which included a presentation by the BEP to students and their families. The 'STEM day' also included a range of other activities including a 'star-dome'. Some past students who are now involved in Secondary Engineer also attended the day and presented activities.

One of the teachers consulted has been using online lesson ideas from the BEP website as the basis for an eight-lesson Bloodhound-themed series. In addition to delivering these lessons to students, this teacher has presented CPD training sessions for colleagues that were created around the lessons developed. These sessions have been delivered to science, technology and mathematics teachers at the school. This teacher reported that the CPD sessions were very well received, and have led to increases in the motivation of teachers, through providing 'something new'.

5.5 Evidence of Raised Aspirations of Pupils and Students

One teacher reported raised career aspirations resulting from the school's involvement with the BEP. An example was provided of a young girl who experienced raised career aspirations: '*One of the girls wanted to be a hairdresser and beauty therapist. She's now looking at chemical engineering - making the makeup*'. The BEP team reports receiving similar feedback on raised aspirations whilst attending events such as science festivals and undertaking visits to schools and colleges. A BEP team member reported that a parent had emailed to say that her nine year-old daughter had become enthusiastic about becoming an engineer since attending a presentation at a science festival in Manchester.

5.6 Participation and Inclusion

Discussions with the two teachers and lecturer identified increased inclusion and participation in STEM as emerging impacts of the BEP. The college lecturer reported that enrolments in engineering were at their highest ever levels at the college, for which the BEP was partly responsible. The primary teacher observed that the school's engineering club had experienced significant growth, and had a slightly higher number of girls than boys as members.

6 Challenges

Throughout the course of the research, interviewees from the BEP and partner organisations identified challenges that face the BEP. Chapter six details those challenges, which are often related to the fast pace in which the BEP has been conceived, developed and rolled out. Another area of challenge, common to many STEM initiatives, is ensuring that a range of educational institutions and young people engage in the programme. This includes encouraging participation from different types of institution (primary and secondary schools, sixth form and FE colleges and educational institutions with different levels of attainment and located within different socio-economic contexts) and from young people of different ages and genders and from different social, ethnic and cultural backgrounds.

6.1 The Fast Pace of Establishment

The BEP has been developed and rolled out very quickly and, as noted previously, much has been achieved in a short period of time. The urgency in the rolling out of the programme has been partly due to the need to align the activities of the BEP with the progress and milestones of the Bloodhound engineering team.

The fast pace of establishment of the BEP has meant that staff are stretched in terms of workload. This is further exacerbated by most posts being part-time. One partner organisation interviewee noted *'I know that [the Bloodhound Education Director] has done three weekends back-to-back at events, and a day job. You can't expect people to maintain that level of work'*.

According to some BEP team members, stretched resources in terms of time and staffing have led to a feeling that the work can be 'frantic' and staff are sometimes just 'fire fighting', attending to whatever need is most urgent from day to day. Comments from some partner organisations have confirmed this assessment. For example, one interviewee from a partner organisation commented that more thought and conceptual planning would have been beneficial for particular aspects of the programme, for example a strategy for targeting particular types of schools and under-represented groups. The Bloodhound team are currently developing policies on equality and diversity and on targeting the more 'hard to reach'/less STEM-engaged schools.

Interviewees from two partner organisations outlined that they had sometimes experienced difficulties in communicating with the BEP, which they recognised may have

stemmed from the fact that it had only recently been established and that the small core team had experienced significant demands on their time. They commented that it had sometimes been difficult to get timely information or approval for decisions.

6.2 Formalisation of Systems

Conscious of the rapid growth of the programme in its short lifetime, BEP staff members have acknowledged the need for more formalisation of systems (for example monitoring and evaluation) to underpin further growth of the BEP. The establishment of the Bloodhound Education Centre should provide a natural 'base' of activities for the BEP, and will hopefully reduce the travel burden on BEP staff. Further development of the network of Bloodhound Ambassadors will also mean that the growing demand for presentations of BEP materials and attendance at events can be more easily accommodated.

Two partner organisations have also identified the need for more clearly developed systems. One interviewee felt that more formalisation in the agreement between their organisation and the BEP would be helpful. Such formalisation of agreements would provide greater understanding of each organisation's role, and would also clarify expectations for both parties. An interviewee from one of the partner organisations also noted that a more consistent policy for the promotion of partner organisations, for example on the BEP website, would be beneficial. This would ensure that all opportunities to promote partner organisations were maximised, whilst helping to ensure that there is an equitable level of promotion by the BEP of the different partner organisations.

While a need for further formalisation has been identified, this in itself will pose challenges to the ethos of the BEP. Interviewees have commented that one of the main strengths of the BEP is its flexibility, and ability to respond quickly to new areas of opportunity. One BEP team member identified that the organisation was very 'entrepreneurial' in its approach to developing and delivering the programme. As the programme grows further, care will need to be taken that introduction of more formalised systems does not overly inhibit the 'entrepreneurial' culture of the BEP or over-burden partners. One BEP team member added that this consideration would also be important should the team look to recruit further members in the future. It was felt that new members would need to be fully engaged with, and enthusiastic about, the programme, and not just be looking for a job.

6.3 Promoting Gender Inclusiveness

BEP team members report that some stakeholders within schools and colleges and existing STEM networks hold the perception that the BEP is not gender inclusive. They report that such stakeholders mistakenly consider the BEP as an example of ‘boys and their toys’. BEP team members fervently maintain that this is not the case, citing the prominent female role-models within the BEP team and the Bloodhound engineering team. The BEP team members and some partner organisation interviewees also report a positive reception to the programme by female pupils/students. Indeed, the BEP activities observed by an NFER researcher included participation and engagement by both boys and girls.

The BEP team is working hard to promote gender inclusiveness and, in doing this, wherever possible, it is developing strategic agreements and links with existing organisations which tackle gender stereotypes and encourage young girls/women to consider engineering. These organisations include the Women’s Engineering Society, Women in Science, Engineering and Technology (WiSET), Women into Science, Engineering and Construction (WISE) and GetSET Women (UKRC). A BEP team member recently attended the Women’s Engineering Society Annual Conference (2009) and also spoke about challenging gender stereotypes at a training day for teachers in Derbyshire organised by Women in Science, Engineering and Technology (WiSET). A BEP team member will also be attending an event in Cornwall in December 2009 which is run in partnership with a local gender equality programme and will bring together girls in year 8 from a number of schools to engage them in STEM and challenge gender stereotypes. The BEP team is keen to increase its involvement in these types of activities as the programme progresses. It also prioritises requests to run activities specifically targeted at young girls/women (including Headstart for girls activities run by the Engineering Development Trust). In addition, BEP staff are currently in the process of developing policies on equality and diversity and are looking closely at the language that they use when presenting to schools and colleges.

However, the team realises that ongoing diligence will be required if the BEP is to quell such misconceptions about the programme and tackle deep-seated stereotypes regarding women and engineering. One BEP team member suggests that thought could be given to developing creative methods of profiling and role-modelling females involved across the education and engineering sides of the project. It would also be useful to develop case studies of schools or colleges involved in Bloodhound which have seen positive impacts on young girls/women in relation to their interest in and uptake of technology and engineering and other STEM subjects. The Bloodhound team reports that a girls' school recently won the Greenpower Challenge and a team of girls won the Defence Science and

Technology Laboratory (DSTL) competition which involved creating a design for the world's fastest bike. It will also be important to ensure that data collected in relation to participation in Bloodhound activities and events includes a gender breakdown and that gender targets are set.

6.4 Timeframes of the Bloodhound Engineering Programme

The biggest appeal for the Bloodhound SSC will naturally occur whilst it represents cutting edge engineering, real-time problem solving, and the excitement that is created by the uncertainty around breaking the world land speed record. This factor drives the urgency of the roll out and establishment of the programme. It will be desirable to maximise the delivery of resources and activities during the limited time period before the attempt at the world land speed record.

In addition to maximising delivery opportunities before an attempt on the record is made, those developing the programme are also considering strategies for ensuring the continued relevance and appeal of the BEP's activities and resources to pupils and students, after an attempt on the record has been made. At the discussion workshop, a representative from one of the partner organisations made the point that the fundamental scientific concepts underpinning the Bloodhound SSC would always be relevant. It was felt that this may ensure its ongoing relevance, especially for primary-aged pupils.

In addition, as mentioned previously, the Bloodhound team is keen to encourage educational institutions and other organisations to further engage in STEM initiatives and, to support this, it is including information on other STEM opportunities and events on the website and developing links with key STEM partners such as STEMNET and the Science Learning Centre Network.

6.5 Equality of Access

As is the experience of many STEM programmes, the schools and colleges most likely to engage with the BEP are those which are well resourced and have proactive teachers and lecturers. However, anecdotal evidence from interviewees suggests that Bloodhound is engaging educational institutions which have not previously been involved in STEM enhancement and enrichment activities. In order to gain more data on the types of schools that it is reaching, the Bloodhound team is developing links with STEMNET Regional Directors and sub-regional contractors with a view to gaining information as to where the schools that it is engaging with are on the STEMNET escalator. The BEP team is also

developing a policy on engaging ‘hard to reach’ and less STEM-engaged schools and is investigating whether there are any examples of best practice in effectively engaging these types of schools. It will, though, remain a challenge for the BEP, as it is for all STEM initiatives, to ensure that it is reaching schools that are less inclined to participate in STEM enhancement and enrichment activities.

Reaching the target of ten per cent of primary schools registering for the programme will also require continued effort from the BEP and it is recognised that primary schools have traditionally been difficult to target with STEM programmes. In addition, the ‘rarely cover’ issue is making engagement with primary schools even more challenging. The Bloodhound team has found working through secondary schools which engage their feeder primaries to be an effective model which will be pursued further. In addition, encouraging Ambassadors to focus on primary schools and to make use of the Primary Engineer resources is another strategy that is planned. The Bloodhound team is also grasping every opportunity to promote Bloodhound and its relevance to primary schools at conferences, shows and events which attract primary teachers such as the Design and Technology Show (held in Birmingham 19-21 November 2009) and the British Education Training Technology Show (to take place between 13-16 January 2010). In 2010, the BEP is also considering piloting a marketing campaign to primary schools in the North West to explore the effectiveness of this approach. If it proves effective, it will consider undertaking more direct mailing in the future.

It may be that the target for primary schools was set too high. However, even if this is the case, it is recognised that working with primary schools is where a real difference can be made to young people’s attitudes and that it is at the end of this stage where young people’s engagement in STEM needs to be maintained and increased.

7 Monitoring and Evaluation

In addition to collecting data on the progress made by the BEP and its partner organisations, interviews also sought information on monitoring and evaluation processes and practices. Chapter seven outlines the findings from this aspect of the research, focussing on monitoring and evaluation data collected by the BEP and partner organisations, in turn. It concludes by presenting some ideas for improved monitoring and evaluation gathered from interviewees throughout the course of the research, and perspectives from the research team itself.

7.1 Existing Monitoring and Evaluation Arrangements: BEP

There are currently basic arrangements in place for the monitoring and evaluation of BEP activities. The BEP team understands that more sophisticated monitoring and evaluation will become increasingly necessary in order to validate the impact of the programme, and identify areas of strength and opportunities for improvement.

Currently, information from those individuals registering for the BEP is stored in a spreadsheet. For individuals registering on behalf of a school, sixth form/FE college or HE institution, data is gathered on the following characteristics of the institution:

- type of institution e.g. primary school, secondary school, sixth form/FE college or HEI
- state or independent
- mixed, girls only or boys only intake, and
- government office region.

Details on Bloodhound Ambassadors are stored in a separate spreadsheet. This source contains various details on Ambassadors, including the following:

- contact details for Ambassadors
- brief information on the route by which they became involved with the programme
- their indicated preferences for volunteering, including whether or not they are available at weekends and during evenings, and
- their progress in becoming an Ambassador (for example, have they simply expressed an interest, have they begun the STEMNET checking process, have they been trained).

Data is available on the number of visits to the Bloodhound Engineering Project website, using Google Analytics software. This allows reporting on the number of visitors to various pages of the website, along with average times visitors remain on the page and what country visitors are from.

While members who are signed up to the BEP do need to log-in to download resources, there is currently no facility for tracking the number of downloads of the various Bloodhound resources available. Likewise, current configurations do not allow data to be gathered on what types of BEP users are downloading which resources.

Since the beginning of the project, BEP team members have spent a lot of time ‘on the road’, presenting the programme at science festivals, science events and schools/colleges. A number of the BEP staff have reported that they regularly receive positive feedback from pupils/students and teachers/lecturers. However, at this time, this data is not being robustly and consistently gathered and analysed.

Some of the individual festivals and events where the BEP team has presented materials have been evaluated centrally by those responsible for organising the event. An evaluation of the Learning Grid Rockingham Festival, of which the BEP was a part, was made available to the NFER research team. The evaluation report shows that the Bloodhound component of the festival was frequently referenced by children when they were asked to mention ‘one new thing’ that they had learned during the festival.

7.2 Existing Monitoring and Evaluation Arrangements: Partner Organisations

Interviews with representatives from partner organisations explored the extent to which they were gathering monitoring and evaluation data relating to the Bloodhound-themed resources and programmes they were delivering. The monitoring data that each partner organisation was collecting varied by organisation, as appropriate to the nature and type of activity that they were delivering.

Table 7.2.1 shows the monitoring and evaluation data that each of the partner organisations interviewed is collecting.

Table 7.2.1 Monitoring and Evaluation: Partner Organisations

Partner Organisation	Monitoring and Evaluation Data Collected
Young Engineers	<ul style="list-style-type: none"> - Young Engineers collects monitoring and evaluation data on the K'NEX Challenge through its network of 40 contract holders which deliver the programme at a local level. - Contract holders report data on the pupils engaging with the K'NEX Challenge, including number of pupils and a gender breakdown. Some basic school data is also collected. - Some contract holders provide qualitative feedback on the level of success of K'NEX Challenge events they have been responsible for.
Primary Engineer	<ul style="list-style-type: none"> - Primary Engineer monitors and evaluates its CPD activities. - The evaluation is designed to be compliant with the TDA's CPD Code of Practice. - Data is collected on the perceived value of the training as well as subsequent impacts upon classroom practice.
Engineering Explained	<ul style="list-style-type: none"> - Engineering Explained collects feedback data from a sample of participants after each workshop. - Questionnaire data is gathered using electronic handsets (known as an Audience Response System, or ARS).
Greenpower	<ul style="list-style-type: none"> - Greenpower gathers attendance data for all of its events, including breakdowns by key stage and gender.
F1 in Schools	<ul style="list-style-type: none"> - F1 in Schools collects attendance data, in addition to informally gathering data during events.

In each case, data is being gathered according to the standard practices of each organisation. No BEP-specific data is being collected at this stage. For organisations like Greenpower and F1 in Schools, Bloodhound-specific impact data may be difficult to capture, due to the BEP activity being tightly integrated into the running of events. However, for organisations like Primary Engineer and Engineering Explained, where BEP activities represent a discrete component of activities, BEP-specific data may prove easier to obtain.

7.3 Opportunities for Improved Monitoring and Evaluation

Throughout the course of the research, it was acknowledged that the BEP will need to strengthen its monitoring and evaluation processes and practices. Some ideas for improved monitoring and evaluation were put forward by interviewees, both from within the BEP team and from partner organisations. Some of these interviewee suggestions, along with perspectives from the research team, are highlighted below:

- more **gender monitoring** and analysis could be undertaken and the **characteristics of the educational institutions involved in the BEP could be explored**. If this proved possible, linking the schools involved in the BEP to the STEMNET escalator

would provide information on schools' prior involvement in STEM enhancement and enrichment activities and would enable the BEP to assess how far it is engaging with 'hard to reach' and less STEM-engaged schools

- a **standardised and short feedback form** could be developed for pupils/students and implemented by Bloodhound Ambassadors, BEP staff, teachers/lecturers and partner organisation staff, as appropriate. Such a feedback form need not be long or complex. Carefully drafted questions could focus on: participants' perceptions of engineering (and STEM) and attitudes and aspirations towards engineering (and STEM) study and careers (where possible both before and after the activity to assess change); what had worked well; and any ideas for improvements. A similarly simple form could also be devised for teachers/lecturers
- a small number of **standardised questions** could be developed. These questions could be a subset of the standardised feedback form mentioned above. Selected questions could be incorporated into existing feedback forms of partner organisations, as appropriate. The advantage of using this approach would be that instruments could be adapted to be appropriate for their contexts, but data gathered would be consistent across the range of activities
- **Bloodhound Ambassadors could be used as 'eyes and ears' for the BEP.** Bloodhound Ambassadors could be encouraged to informally explore the level of engagement with the BEP at the schools they visit. (For example, do they use BEP online resources, or interact with other partner organisations?)
- a more formalised **system of reporting for Bloodhound Ambassadors** could be considered. For example, Ambassadors could be asked to fill out a basic proforma for each interaction they have with a school. This might include information on the location of the school, the number of participating pupils/students and their level/age ranges and which activity was delivered. Additional basic data could also be collected including recording any feedback received, noting what worked well and any ideas for improvements
- opportunities for **tracking the number of downloads from the BEP website** could be explored. Teachers/lecturers and other registrants already enter log-in details to download materials. Closer scrutiny of these downloads would allow an assessment of what types of institutions are downloading which resources and the popularity of different types of resources. There may also be an opportunity to gather data from teachers/lecturers and other registrants at the point of download, or when they re-visit the site, through a pop-up question
- Engineering Explained will be collecting a large amount of data from students through an ARS questionnaire. It is keen for the BEP to have **some input into the questions that are asked of students**. Over the next 12 months, Engineering Explained plans to gather data in this way from each Bloodhound-themed workshop that is delivered, which could yield up to 2700 questionnaire responses, and
- there currently exists some separation within the BEP's existing monitoring and tracking arrangements. For example, the tracking spreadsheet for educational institutions is separate from the Bloodhound Ambassador spreadsheet. More effective monitoring may be achieved by **centralising and combining these spreadsheets** into a searchable database. One immediate advantage of an integrated monitoring system would be the ability to match educational institutions registering for the BEP with their nearby Bloodhound Ambassadors.

It would also be beneficial for the BEP team to develop some good practice case studies of schools and colleges whose staff and pupils/students have gained significant benefits from their involvement with the BEP. This could include some schools where young girls/women have been particularly impacted by the programme. In the longer-term, it would also be worth considering following up a sample of institutions and pupils/students involved in the programme to establish longer-term impacts.

In discussing future monitoring and evaluation arrangements with partners, the BEP will need to give attention to the data already collected, and arrangements will need to be customised to each partner. Care will need to be taken to ensure that partners do not feel over-burdened.

8 Concluding Comments

In the short time since its launch, the BEP team has made good progress in developing and implementing the various aspects of the programme. The considerable numbers of educational institutions and other organisations (such as scout groups) registered for the programme, and the development of the Bloodhound Ambassador network, represent solid achievements. The online presence of the BEP is strong, and it benefits from a prominent position on the broader Bloodhound Engineering Project website.

Equally, the partnerships between the BEP and partner organisations responsible for delivering Bloodhound-themed activities, resources and materials have developed effectively. At the time of the research, some of these partner organisations were already delivering Bloodhound-themed content, while others were preparing to roll out their initiatives in the 2009/10 academic year. Beyond that, the Bloodhound team has also worked hard to develop wider partnerships with other key organisations providing STEM enhancement and enrichment opportunities and teacher professional development, such as STEMNET and the Science Learning Centre Network.

Throughout the research, many interviewees have been very enthusiastic about the BEP. Its innovative approach to providing activities, resources and materials through partner organisations is seen as a key strength of the programme. Through using this approach, it has been possible to take advantage of both the excitement generated by the Bloodhound concept, and the expertise of existing networks and programmes.

The greatest challenges faced to date have been primarily related to the quick establishment and roll out of the BEP. Tight timeframes and large workloads have stretched BEP team members at times. As the programme develops, the team might want to consider developing more formal systems and processes. This could include developing more formal agreements with partners and setting out clear monitoring and evaluation requirements. However, while BEP staff have acknowledged that formalising their systems and processes will be important, they have also identified that the flexible and ‘entrepreneurial’ ethos of the organisation is key to its success. Maintaining a balance between these factors, in addition to limiting the burden placed on partners, will be important challenges for the BEP team over the coming months.

In relation to monitoring, the gathering of data is currently occurring at a basic level. The programme will benefit from more focus on collecting data about the characteristics of the educational institutions and young people engaging with the programme. This

knowledge will aid the BEP's continued efforts to increase the participation of primary schools and less STEM-engaged schools in the programme and will support the drive to ensure that young people from different socio-economic and ethnic backgrounds and of different ages and genders, with a particular focus on girls/young women, are engaged in the programme.

In addition, to enable a more rigorous assessment of the programme's quality and effects to be made, it will be beneficial to develop more robust evaluation systems that capture satisfaction and impact data from programme participants, deliverers and key stakeholders.