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1. Introduction

The successful outcome of the Stage 1 and Stage 2 Bids for the School of Chemistry to become a Higher Education Funding Council for England (HEFCE) funded Centre for Excellence in Teaching and Learning (CETL) was announced in January 2005. Bristol ChemLabS (Bristol Chemical Laboratory Sciences), the only CETL (of 74) devoted to chemistry, officially started on 1 April 2005 with funding for five years. Funding was awarded in two categories, namely £2m for capital projects and £2.5m for recurrent costs over the five years, details of which are presented in Section 6.

The premise of both bids was that Bristol ChemLabS would build on the demonstrable excellence already established in undergraduate chemistry teaching in the School of Chemistry and would further develop flexible, modern facilities and processes for learning chemistry’s core practical element. It would seek to transform the student experience of practical chemistry at Bristol and set a new standard for the laboratory-based learning of science generally.

Bristol ChemLabS therefore seeks to:

- Engage, educate and enthuse students at all levels of experience and;
- Create a major national resource for teaching and learning practical experimental science.

Its central objectives are:

- To develop and embed enhanced, e-facilitated, learning of practical chemistry by undergraduate and postgraduate students at Bristol.
- To establish:
  - Refurbished, professional-standard laboratories.
  - The use of state-of-the-art equipment, instrumentation and professional practices by undergraduate students from the outset of their education.
  - Facilities and materials for the e-learning of modern laboratory chemistry, including the use of a Dynamic Laboratory Manual, on-line e-assessment and safety training.
- To host:
  - University Teaching Fellowships allowing staff to focus on educational innovation.
  - Teacher/Outreach Fellowships for seconded school teachers.
  - Continuing Professional Development (CPD) courses for chemistry educators and industrial scientists.
  - Outreach activities for all levels of pre-university education.
  - Public engagement in science activities.
- To export enhanced protocols for learning laboratory-based sciences into other Bristol contexts.
- To disseminate new protocols for the teaching and learning of practical physical science nationwide through the Higher Education Academy (HEA), the Royal Society of Chemistry (RSC) and the National Science Learning Centre Network.
- To evaluate, mainstream and sustain these activities.
Key events which have followed the official start of Bristol ChemLabS in April are listed below. Further details are to be found in subsequent sections of this report and in the Appendices as indicated.

- The establishment of the Management and Advisory Boards, in line with proposals made in the two Bids, the remits and current memberships of which are given in Appendix 1.

- The holding of the first Stakeholders Conference in May 2005 in which stakeholders from industry, schools, professional bodies and government organisations received presentations on the Bristol ChemLabS vision and attended workshops on topics including experimental design, the Dynamic Laboratory Manual and Outreach activities.

- The setting up of a Laboratory Working Party chaired by ChemLabS Director, Dr Paul Wyatt, with representation from across the School of Chemistry (Appendix 1) and charged with developing revised experiments for the laboratories, determining student attainment targets in terms of learned practical skills, establishing new methods of e-assessment for pre- and post-laboratory work and ensuring proper levels of safety training (Section 2).

- Establishing a Building Working Party chaired by the Head of Physical and Theoretical Chemistry, Professor Mike Ashfold, including the ChemLabS Director, the Teaching Laboratory Managers and the Senior Laboratory Technician (Appendix 1). This group is charged with oversight of all matters relating to the teaching laboratory refurbishment, including design issues, laboratory furniture, IT hardware and liaison with the appointed buildings project managers, architects, engineers and University of Bristol Building Services and Safety Office (Section 3).

- The appointment of University and School Teacher Fellows and other staff (Section 5).

- The appointment of IMPACT Faraday, under the leadership of Dr John Eastman, to develop and deliver the Dynamic Laboratory Manual (Section 2).
2. Laboratory Working Party

(i) Background: Staff within the School of Chemistry are enthusiastic about the opportunities that the success of the CETL bid has given us to review the format and content of our laboratory courses. The award has allowed us to reconsider not only the subject material that is covered, but also think about the practical skills and techniques that we wish to our students to develop or the instrumentation and other equipment that we believe they should experience. In addition, members of staff have increasingly voiced the opinion that the traditional method of assessment of students by means of formal write up is inadequate. These reports often add little to the student experience of practical chemistry and are not necessarily an especially good way of gauging ability. Furthermore, they are time consuming to write and time consuming to mark.

In the summer of 2005 we instituted intensive laboratory sessions between the end of exams and before the end of term in which first-year students started their second-year practical work. This was aimed at alleviating the impact of the laboratories being closed for much of their second year. It was also an opportunity for us to experiment with innovative forms of assessment, including assessing the students in the laboratory period itself with pro formas and discussions with demonstrators. Feedback shows that these intensive laboratory sessions were well received by both undergraduate students and demonstrators.

(ii) The Working Party Remit: The working party was established to reconsider completely the structure and content of laboratory teaching in Levels 2 and 3. The Level 1 practical course was completely redesigned a few years ago and has been a tremendous success. There are therefore no plans to change the structure or content of this laboratory, although there will be a profound change in delivery by virtue of the new Dynamic Laboratory Manual. The working party began by considering what skills it considered students should have by the end of Level 2 and the end of Level 3. This was informed by ‘brainstorm’ sessions that were held at the Sectional level and then fed to the working party.

(iii) Aims: Possibly for the first time, laboratory organisers from all Sections have come together and discussed the broader objectives that the laboratory are intended to deliver and the details of the experiments. The level and degree of connection between the Sections that have arisen from these meetings have been quite striking:

(a) Integrated laboratory: The working party considered that the chemistry should be taught in a coordinated way to cover the skill set which had been identified.

(b) Assessment: Although there would be an element of formal writing up of experiments, this would probably only be for about a quarter of the experiments. Much of the assessment would be done in the laboratory or before the practical session.

(c) The Learning Experience: Traditionally, most of the work for an experiment is done afterwards (as the write up). This often means that only after the experiment does the student understand what was being done. The working party considered that there should be a total shift in focus to doing most of the work before the experiment. Students will thus understand what they are doing at the time and this will be educationally more beneficial. This prelaboratory material will be done and automatically assessed online.

(d) Intensive sessions: Students responded positively to the intensive two-week summer sessions. We intend to have a similar period of Level 2 material at the end of the first year to prime students with many of the skills they will need as well as excite them with a taste of what is to come.
(e) Thinking & Design: At Level 3, some in-depth consideration before the experiment is undertaken is envisaged. This would go beyond the prelaboratory work planned at Level 2 or what is currently done at Level 3. It may include some work in groups to consider the synthesis of a molecule or the measurement of a property.

(iv) Achievements: The broad design of the Level 2 laboratory course is nearing completion and will be finished by Easter 2006. The titles and content of each experiment have been devised and related to the intended learning objectives. The experiments will be refined once the broad design of Level 3 is in place so that we have a laboratory that is integrated across the years as well as across the Sections. It is expected that the content of the Level 3 laboratory will have been decided by Easter 2006.

(v) The Dynamic Laboratory Manual (DLM): A contract has been agreed between Bristol ChemLabS and IMPACT Faraday to deliver the DLM. Regular meetings involving the IMPACT team, led by Dr John Eastman, and the Laboratory Working Party take place and the broad outline format of the DLM has now been established. It is expected that the Level 1 DLM will be ready for January 2007 in time for the opening of the new laboratories with those for Levels 2 and 3 following in October 2007 at the start of the 2007–08 academic year. Each student will have their own version of the DLM, which they will be able to annotate and into which they will be able to enter data. Moreover, as well as providing an interactive, web-based laboratory manual, the DLM will include video clips of experimental techniques, interactive e-assessment and on-line safety training. It will be linked to the existing School of Chemistry web-based marking system and demonstrators will be able to interrogate the system to determine whether students have carried out the pre-laboratory work and safety exercises. The DLM will also be linked to the University’s Virtual Learning Environment (VLE), Blackboard.

![Image of a virtual experiment that is included in the pilot DLM. This virtual vacuum line will allow students to practice the techniques that they will actually use in the laboratory as part of an experiment to measure the enthalpy of vaporisation of methanol.](image.png)
3. Buildings

(i) The Project: The building project to refurbish the teaching laboratories began in mid December 2005 with the initial strip-out of asbestos by a specialist contractor. Work was originally planned to last 1 month, although some additional asbestos dust has been detected which must be removed prior to further works. However, it is unlikely that significant delays will be incurred. Another contractor has been appointed to complete the enabling works i.e. the process of removing the existing laboratory benching, fume cupboards, fixtures, fittings, flooring, ceiling and ducting and this work is due to begin before the end of January 2006. The process of tendering contracts for the main building contractors has begun and it is expected that this will be in place by mid February 2006.

(ii) The Outside Appearance: Final plans for the new external appearance of the West Block of the School of Chemistry, in which the teaching laboratories are located, were approved by the City Planners in November 2005. The West Block building will be clad and windows replaced in line with the existing South and East Blocks, refreshing the current, rather tired, exterior. An architect’s drawing of the South Elevation of the School of Chemistry building is shown in Figure 2. In order to accommodate the additional plant needed to service the greatly increased number of fume cupboards, an extra storey will be added to the top of the building.

Figure 2. Architect’s drawing of the South Elevation of the School of Chemistry.

(iii) The Laboratory Layout: The existing layout of the two floors occupied by the teaching laboratories will be retained in general terms such that the service area will remain in the centre of each laboratory, the benches will run in the same direction and there will still be fume cupboards along the outside walls. In addition, there will be many more fume cupboards in two blocks in the centre of each laboratory as shown in Figure 3. A tutorial area has been added to expand the functionality of the laboratory by having an area for dry experiments, analysis of spectra and for group discussions. This area will have an interactive whiteboard available for discussions or presentations. Architects and Mechanical and Electrical Engineering drawings have been prepared to the satisfaction of the Buildings Working Party. These drawings will be passed to the main contractor, when appointed, and will form the basis for the production of detailed construction diagrams which will also be subject to final approval and modification by the Buildings Working Party prior to final implementation.

(iv) Fume cupboards: Since there will be a substantial increase in the number of fume cupboards in the new laboratories, a considerably increased plant is required to move the air in and out of the building. In order to keep the plant size within manageable proportions, a low airflow system that requires less energy will be employed. This will use new technology and optimised aerodynamic design to ensure that the system does not compromise containment within the fume cupboards. It is planned that visits to potential fume cupboard manufacturers by the Buildings Working Party, Architects and Engineers will start in mid January 2006.
(v) Laboratory Furniture: Quality of construction is considered essential in an undergraduate teaching laboratory and a number of potential manufacturers have been asked to provide mock-up benches and to discuss the materials and design offering the best solution. On this basis, a plinth design has been chosen, with fixed cabinets, and with the bench-top mounted on a steel sub-frame. Successful, tried and tested design features from the experience of the Synthetic Chemistry Building of the School of Chemistry have been incorporated, such as drip-catching grooves on bench undersides, coved flooring, finger-rail openings, extra-strong hinges and robust construction materials. Improvements have also been sought, such as water-resistant materials for sink units etc. The use of cupboards containing robust plastic trays has also been adopted which will allow the technical staff to prepare and distribute the materials required for particular experiments quickly. Moreover, the design and layout of the laboratories has been developed in concert with the design of the laboratory course (Section 2) to enable the educational requirements to be met, and also to make use of the laboratory as efficient for staff and students as possible.

(vi) IT provision: An IT terminal, probably equipped with a touch screen, will be located at every student position from which they will be able to access the Dynamic Laboratory Manual and at which they will be able to enter data. The DLM will also be tailored to each individual to allow them to annotate their own version for future reference at a remote location. Each bay within the laboratory will have a projector and screen at which the students will be able to receive introductions in groups which may involve watching a video introduction. It is also envisaged that a demonstrator equipped with a tablet PC or PDA will be able to illustrate a particular aspect of the experiment via the projector. The process of discussing IT requirements with manufacturers and suppliers has started and a provisional timetable for the introduction of the IT hardware and software during 2007 has been agreed.

(vii) Services: In addition to the usual laboratory facilities, there will be recirculating cold water for condensers (so as to avoid running cold water to waste) and hydrogen and helium supply in some areas of the laboratory for gas chromatography. Natural gas is no longer required and vacuum will be supplied locally (mainly in the fume cupboards) from diaphragm and rotary pumps.
Figure 3. Diagram of proposed West Block level 6 laboratories, showing practical, support and tutorial areas.
4. Outreach

Significant extra effort has been put into Outreach activities since the start of Bristol ChemLabS in April, building on the success of an established programme within the School of Chemistry.

We have been working actively with schools from as far away as Devon, Dorset, Mid Glamorgan and Warwickshire with around 1500 secondary school students and teachers taking part in events in the autumn term of 2005 alone. Several thousand more primary-school pupils, who are too young to come into the School of Chemistry, have also been engaged in activities created and disseminated through ChemLabS. Most of these Outreach activities are intended to offer support for local schools rather than as a student recruiting exercise, although as the geographical spread of our contacts widens, we hope that there will also be some benefits for our undergraduate recruitment.

Considerable time and effort has also gone into making contacts with other Higher Education Institutions (HEIs) to allow us to increase further the range and scope of activities that we will be able to offer in coming years.

In addition, we have been collaborating with other organisations, from professional bodies to charities on Outreach projects. Discussions have begun with the Royal Society of Chemistry, Institute of Physics, Laboratory of the Government Chemist, Wellcome Trust, The Royal Institution and The Royal Society. We have also continued to work with Aimhigher and Excellence in Cities as part of the University of Bristol’s Widening Participation programme.

Our Outreach activities have already proved very successful. Indeed, the feedback that we have received from participants has been excellent. The comments received from Rachel Hopwood, who was speaking for a very happy group of sixth-form students from The Castle School, Bristol, is typical:

‘We have just attended the lectures this afternoon [...] We had 23 pupils with us in the end and I can honestly tell you that the words they used to describe their experience this afternoon included, “fantastic”, “wicked”, and “excellent”. It was thoroughly enjoyed by all. I am sure that we will attend this lecture every year for as long as it can be scheduled.’

Details of a selection of activities are given below, with a more comprehensive list provided in Table 1 of Appendix 2.

(i) Working with Pupils and Teachers from Schools:

(a) Primary Science: Autumn 2005 saw a significant increase in our primary-school Outreach work. Three competitions are currently on going:

- **Chem@rt**: 45 primary schools are using the Chem@rt portfolios of 16 images taken by staff at School of Chemistry to act as stimulus material for literacy and art work. It is estimated that 3000–5000 pupils are engaged from in the activity, with ages ranging from reception-class pupils up to those in Year 6.

- **An on-line Science Quiz** via Blackboard (the University’s Virtual Learning Environment) has over 1200 pupils enrolled.

- The **Minute Challenge** where pupils are challenged to come up with unusual ways of timing sixty seconds. 12 schools are currently engaged in this activity. Visits to the schools will be made to judge the most accurate solutions.

Certificates and prizes will be issued for the best accomplishments in all these competitions and we are currently seeking funding to make Chem@rt 2006 a national...
project. Chem@rt has also been invited to exhibit at two local arts festivals and can be currently seen at Thornbury Museum.

Participation in primary Science Weeks, for one or two days, is also taking place. A recent day in Thornbury saw a full-school chemistry flash-bang demonstration on *Gases in the Atmosphere* followed by practical circuses of experiments that involved postgraduate students. At least three more visits will take place in the spring term. Two other primary schools that have acted as pilot schools in the past, High Downs Infants, Portishead and St Michaels, Clifton, have worked with us again in their Science Weeks this year. A final-year undergraduate BSc Chemistry student, Sophie Fosset, is also working on a project supervised by Dr David Smith to develop science workshops at St Michaels.

(b) Top of the Bench Practical Chemistry Competition: Top of the Bench is a national competition run by the RSC for 14–16 year-old students. The heat, organised for schools in the local area, took place one evening in November 2005 at the School of Chemistry. The winning team competes in the UK Final.

(c) Year 9 Chemistry On-line Quiz: Trials of this quiz in the summer term, using Blackboard, were successful. We are in discussion with Dr Kate Burrell (RSC Aimhigher Next Generation National Coordinator) about holding a national version of this to increase the profile of chemistry in schools in much the same way as the Maths Challenge (University of Leeds) has done for mathematics. www.chm.bris.ac.uk/schools/secondary_schools.html

(d) Salters’ Festival: The annual Festival for years 7–9 was held in the summer 2005.

(e) Year 10 Structure and Bonding Workshop: This workshop, which was created at the request of local teachers, follows on from two successful workshops held in 2003 and 2004. A greater emphasis has been placed on practical chemistry in the revised version, which was piloted in December 2005 with 30 students participating from two schools. The workshop comprised a 90 minute practical circus on polymers and a one hour lecture demonstration. Feedback received was very complimentary.

(f) A-Level Chemistry Practicals: The first batch of a series of post-16 chemistry practicals was trialled with school students for four days in July 2005 with an interim report sent to the RSC. The eventual aim will be to host full days or afternoons of A-level practicals for schools each term in the new undergraduate teaching laboratories when they are not in use by undergraduate students.

(g) Spectroscopy Workshops for A/AS-level Chemistry Students: During September and December 2005 there were 16 sessions with over 30 schools and around 500 students. The accompanying members of teaching staff have also found this to be a very valuable exercise, providing them with an update on the latest spectroscopic techniques.
(h) Workshops on Perfume Chemistry: A trial of a day-long workshop with a professional perfumer and 16 post-16 students at Badminton School has taken place. With a grant from the Royal Society, Key Stage 4 female students from five science colleges will be able to have the same experience as part of a much larger perfume chemistry project involving chemical synthesis and working alongside postgraduate researchers (and much more) at the School of Chemistry. A Saturday workshop on perfume chemistry has even been organised to take place in February 2006 at the request of undergraduate chemistry students at the University of Bristol.

(i) The National Academy for Gifted and Talented Youth (NAGTY): A two-week Summer School on the Chemistry of the Pharmacy was devised and held in 2005. With the refurbishment of the teaching laboratories in 2006, ChemLabS will contribute one week of a Physical Science summer school in cooperation with the School of Physics using the biochemistry teaching laboratories.

(j) Schools Chemistry Conferences: The three programmes put on for Chemistry Week in November 2005 saw over 720 students and teachers from a wide variety of schools in the region attend a total of nine lectures ranging from the chemistry of cosmetics through to the chemistry of mobile phones and flash-bang lecture demonstrations. Following on from the success of these conferences, it has been decided to hold two such conferences per term during 2006. Not only will this make use of the services of eminent local and national speakers, it will also expose new talent from the ranks of postgraduate students and researchers from The University of Bristol.

(k) Videos of Practical Chemistry Demonstrations: Considerable time has gone into making the first instalment of videos of the more dramatic chemistry experiments. They will be hosted on the ChemLabS website and will be freely downloadable for use by schools. A second instalment will be produced during the spring term.

(l) Writing for Schools: Several articles have been written for school science magazines such as Chemistry Review and Education in Chemistry, which promote either research going on in the School of Chemistry by translating it into a style appropriate for A-level students or Bristol ChemLabS Outreach activities. Tim Harrison is now a chemistry reviewer for Science in School (a new pan-European science teachers’ magazine) and
Dudley Shallcross is on the editorial board of Education in Chemistry. Younger postgraduates and researchers are also being encouraged to contribute.

(m) Science and Engineering Ambassadors (SEAs) Training: Training to support postgraduate students who wish to participate in school’s work has been organised with 38 postgraduates taking the course in October 2005 and a further 35 awaiting training in February 2006. The SEAs training was held in conjunction with SetPoint Gloucestershire. The possibility of using undergraduate students in similar roles (UAS-Undergraduate Amabassadors Scheme) will be explored in February 2006.

(n) Chemistry Teachers Training Sessions: Two full-day workshops for improving competency in the delivery of practical demonstrations have been devised and delivered. These events, held in conjunction with Regional Science Centre — Southwest, are aimed at teachers of chemistry who are not subject specialists. Excellent feedback has been received. A development of this project is the likely provision of similar workshops for science students at the University of Bristol, Graduate School of Education during 2006/7. Full-day workshops on spectroscopy for teachers have been run annually and these will continue. Additional workshops for teachers are planned for 2006, with half-day Continuing Professional Development sessions on atmospheric and microscale chemistry.

(o) The Monitoring of Outreach Opportunities taken up by Chemistry Undergraduates and the Affect on Degree Choice: All the new first year chemistry undergraduates have been surveyed on their history/experience of visiting chemistry departments, and other venues, for chemistry workshops, lectures (excluding interviews and open days) etc. prior to application. A follow-up will be carried out with some of these students to look at what motivated them into choosing a chemistry degree programme.

(p) Other Activities: In addition to the activities listed, we have been able to collaborate on smaller projects with many other schools who have asked for help in running spectra, providing activities for small groups such a science clubs or in the promotion of chemistry generally.

(ii) Working with Other Higher Education Institutions.

(a) Outreach Liaison (Universities of Nottingham, Warwick and Manchester): Initial meetings have been held with Outreach Directors of Chemistry Departments at the Universities of Nottingham, Warwick, and soon Manchester, to look at the pooling of Outreach resources and to investigate using collective ‘clout’ to secure sizeable funding for Outreach activities. All are in agreement that Outreach activities do little to stimulate recruitment from the immediate area of the host university but it is likely to lead to interest in chemistry courses in other parts of the UK. It is therefore in the interest of chemistry departments to promote chemistry and the chemical sciences.

(b) Chemistry Short Courses by Distance Learning (Open University): We are in the early stages of negotiation with the OU with the aim of working in the provision of additional Level 1 Science Short Courses with a chemistry bent. Such undergraduate courses are becoming increasingly popular with sixth formers and a recent change in the law allows HEIs to provide undergraduate courses in 11–18 schools. The courses being proposed would broaden the chemistry knowledge of sixth formers and the proposal includes the provision of a full day’s practical work in the new ChemLabS teaching laboratories.

(c) Post 16 Analytical Chemistry Competition (University of Plymouth): In preparation for the reopening of the teaching laboratories in 2007, we are working with Plymouth University chemists on a full-day’s senior analytical competition which is being held in the Peninsula Region in March.

www.chm.bris.ac.uk/schools/masterclass.html

www.chm.bris.ac.uk/schools/press_release.html
(d) National Science Centre (University of York): We will be making a major contribution to a three-day conference in 2006 for science teachers about contemporary issues in science.

(e) Grätzel Cell Workshops for Teachers and Students (University of Loughborough): A session for the training of teachers in the use of this contemporary ‘green’ chemistry has been held and half-day workshops for school students in the South West have been planned with the first in February 2006.

(f) Joint Chemistry Summer School (Trinity College, Dublin): A week-long chemistry experience is being planned for July 2006 for sixth form students from the South West that will have 45 prospective chemists taking part in laboratory exercises and field visits in a pilot of what is hoped to become an annual two way student exchange.

(iii) Working with Other Organisations:

(a) Working with the British Association for the Advancement of Science (The BA): The BA Science Festival 2005, held at Trinity College Dublin, was attended by both the Bristol ChemLabS Outreach Director and the School Teacher Fellow. Many useful contacts were made and good ideas assimilated. Tim Harrison and Dudley Shallcross have been invited to give school’s lecture presentations in September 2006 at the University of East Anglia. A project initiated by ChemLabS involving Rednock School students represented the BA at the National Launch of an Engineering initiative ‘Shape the Future’ at the Science Museum London in December.

(b) Visually Impaired Summer School: As part of a programme of Science Enrichment Days, a Visually Impaired (VIP) Summer School was run in collaboration with the Department of Physics. The students, who were from all over the UK, ranged in age from their late 20's to over 80. Some had been blind from birth, with others having become either partially sighted or blind at some point in their life. Students were accompanied by their sighted guides. The summer school included practical work, lectures and visits. The 2006 summer school is to be entitled All at Sea.

(iv) Forthcoming Events: A number of additional initiatives are also being planned:

- A Schools’ Lecture series, ‘The Chemistry of …’, is being considered for the new school year. Professor Alex Jeffries, with The Chemistry of DNA fingerprinting and Graeme Jones with The Chemistry of a Saturday Night have already been approached.
• *Full day practical workshops* for Key Stage 3 students (14 year olds) leading to CREST and Science Communicator bronze awards.

• *Additional workshops* to be taken out to secondary schools including:
  - producing images via the chemistry of blue printing,
  - fuel cells,
  - atmospheric chemistry and carbon dioxide sensors,
  - Grätzel cell workshops.

• *Other Summer Schools:* The University of Bristol run a number of summer schools in which the School of Chemistry participates each year. With the cooperation of the Department of Biochemistry, we expect to participate again this year in:
  - The Sutton Trust Summer School for Year 12 students (2\textsuperscript{nd} – 7\textsuperscript{th} July 2006)
  - Higher Education Summer School for Year 10 students (3\textsuperscript{rd} – 7\textsuperscript{th} July 2006)
5. Staffing

Details of the staff involved in the Bristol ChemLabS project and the membership of the different Boards and Working Parties are listed in Appendix 1. Several members of staff have been appointed to the Bristol ChemLabS project since 1st April 2005:

(i) Bristol ChemLabS School Teacher Fellow: Mr Tim Harrison has been appointed for one year in the first instance as the first Bristol ChemLabS School Teacher Fellow. It is intended that the School Teacher Fellow should be a seconded, experienced secondary-school teacher who is charged with finding ways to stimulate an active interest in chemistry by school pupils of all ages. The School Teacher Fellow liaises closely with the ChemLabS Outreach Director and many of the current projects being undertaken are noted in Section 4 and listed in Table 1 of Appendix 2. Tim studied Chemistry at King’s College, London and obtained a Postgraduate Certificate of Education (PGCE) from Warwick in 1982. He began teaching at Crown Woods School (ILEA), in Eltham, London and in 1988 he moved to Rednock School, Dursley, Gloucestershire as Head of Chemistry. He is now the Science College Director responsible for working with the community and for student extracurricular science activities. Tim has also taught in Australia as a seconded teacher. He holds an Open University MSc in Science and is a marker and item writer for a number of examination boards. He was awarded a Royal Society of Chemistry Schools Education Award for 2005.

(ii) Bristol ChemLabS University Teacher Fellow: Dr Russell Cox of the School of Chemistry was appointed as the first Bristol ChemLabS University Teacher Fellow in October 2005. The role of the University Teacher Fellow is expected to change as the Bristol ChemLabS project matures but in the first year or two of the project, the University Teacher Fellow will be a seconded member of the School of Chemistry at Bristol charged with the planning and development of key aspects of the new laboratory teaching experience. Russell Cox is particularly involved with the design of the new laboratories through discussions with architects and IT experts. He has also been an important contributor to the deliberations of the Laboratory Working Party (Section 2) concerned with the development of new laboratory experiments and assessment methods. Russell Cox obtained BSc and PhD degrees in chemistry from the University of Durham and in 1996 was appointed to a lectureship at the University of Bristol after periods of post-doctoral study in Canada and the UK. He was promoted to Reader in 2004. One of his first roles as a lecturer was to take responsibility for a new, advanced Level 3 MSci teaching laboratory, and until recently, he was also responsible for the Level 2 organic teaching laboratory.

(iii) Bristol ChemLabS Manager: Dr David Smith was appointed as Bristol ChemLabS Manager in April 2005, taking up the position in August when he transferred as a Lecturer in Physical Chemistry to the School of Chemistry from the University of Exeter. As the ChemLabS Manager, David Smith works closely with the Chief Executive and the Director on all areas of the ChemLabS project having engaged particularly, in the first few months, with Outreach and educational matters as a result of his considerable previous experience. David Smith studied Natural Sciences at Girton College, Cambridge, specialising in Chemistry. He also received his PhD from the University of Cambridge and following post-doctoral work in Birmingham and Southampton was appointed to a lectureship at Exeter. Whilst there, he acted as Undergraduate Admissions Tutor and as Chair of the Teaching Committee for Biological and Chemical Sciences. He also served on the University’s Undergraduate Teaching Committee and a number of other University committees.

(iv) Bristol ChemLabS Secretary: Ms Claire-Lise Braun was appointed as a full-time secretary to Bristol ChemLabS in August 2005 after a period of two months working on a temporary contract. In addition to normal secretarial duties, Ms Braun is responsible for the maintenance of the ChemLabS website.
6. Budget

The CETL award to Bristol ChemLabS comprised funds for both capital projects and recurrent costs, details of which are given below.

(i) Capital Budget: The sum awarded by HEFCE to the Bristol ChemLabS CETL was £2m, the largest amount for which bids could be made in this category, to be spent in the first two years of the project. This funding will provide a major contribution to the costs of the refurbishment of the undergraduate teaching laboratories, which comprise both laboratory infrastructure and furniture costs, as well as the costs of new, state-of-the-art equipment, instrumentation and IT infrastructure. Additional major work to be carried out alongside the teaching laboratory refurbishment will include the complete renovation of the exterior of the West Block of the School of Chemistry, in which the teaching laboratories are located, as well as other internal works such as the creation of small-group teaching space and IT facilities associated with the ChemLabS project and construction of two research laboratories. The total expenditure will be about £18.5m. A bid to HEFCE for an additional £700k for a joint capital project with the other University of Bristol CETL, Applied and Integrated Medical Sciences (AIMS), was made in late December 2005, at HEFCE’s request. The outcome will be known in Spring 2006. If successful, this funding will be used to modify and refurbish the link areas between the West and South Blocks for AIMS and between South and East Blocks for Bristol ChemLabS. The refurbished space for ChemLabS will be used for additional teaching and Outreach activities.

(ii) Recurrent Budget: A recurrent budget of £500k was awarded by HEFCE for each of the five years of the CETL project based upon the business case made in the Stage 1 and Stage 2 bids. HEFCE have subsequently indicated that virement between budget headings and also between CETL financial years is possible. A detailed budget has been agreed between Bristol ChemLabS and the School of Chemistry and a list of headings for which funds from the recurrent budget will be used in the first year (and subsequent years) of the CETL project is given below.

(a) Salary costs of existing staff including the University Teacher Fellow, the Bristol ChemLabS Manager, the Teaching Laboratory Managers and the Teaching Laboratory Technicians;

(b) Research support costs for the Chief Executive and Director;

(c) New staff costs including the School Teacher Fellow and the ChemLabS Secretary;

(d) Evaluation and academic audit;

(e) Laboratory equipment and IT infrastructure additional to funds available in the capital budget;

(f) The Bristol ChemLabS Office;

(g) Dissemination;

(h) Outreach.

All use of CETL funds will be subject to review and audit through the Annual Monitoring Statement, which the University is required to submit to HEFCE regarding the use of all HEFCE funding.
7. Evaluation

(i) Background: Evaluation of the ChemLabS project will take place for several reasons. Firstly, it is important that we evaluate the current student experience to inform the changes we make and ensure we address areas where teaching and learning can be improved. Secondly, we will involve students to evaluate the changes we make as we go and we are also keen to measure the improvement in the laboratory experience so we can clearly demonstrate that the project has been successful.

We have set out to involve undergraduates at every stage of the evaluation process within the ChemLabS project as the student perspective is crucial. The views of students who have experienced both the old and new laboratories will be especially valuable.

(ii) Student involvement:

(a) Focus Groups: A number of undergraduates from each year have agreed to be Focus Group Leaders. These students have already had a meeting to design their own questionnaire about the whole undergraduate experience, which will be circulated to current students and then again in the new laboratories. The Focus Group Leaders have assembled groups of students to represent the student body for discussions with Dr Sibel Erduran of the Graduate School of Education.

(b) Graduate School of Education: The Graduate School of Education has agreed to become involved with the student groups and question each of the groups about their experience of the laboratories. It is believed that students are likely to be more open and honest with an outside agency than they would with a member of staff from the School of Chemistry.

(c) Dynamic Laboratory Manual: The prototype experiments for the DLM are based upon current experiments. Some of these prototypes have already been tried out with students in the closing weeks of the old laboratories. We imagine more student involvement as the DLM continues to be developed.

(d) Laboratory Documentary: A final-year undergraduate project this year has involved making a video documentary about the current undergraduate laboratories. Two students have worked together to produce storyboards, interview staff about Bristol ChemLabS and interview students in the laboratory.
8. Sponsorship

One of the aims of Bristol ChemLabS is to obtain both sponsorship and academic/intellectual input from key stakeholders. Some of the plans for 2006 are listed below.

(i) Schools: When a complete list of undergraduate experiments for the new teaching laboratories, and attainment targets in terms of learned practical skills, is available in 2006 (Section 2), this information will be passed to all the schools in the Outreach database. They will be asked to review the material and to comment, via an on-line questionnaire, on all aspects of content, taught skills and assessment protocols with a particular emphasis on the Level 1 laboratory content and the interface with A Level practical syllabuses. This exercise will be led by the Tim Harrison, the School Teacher Fellow.

(ii) Industry: A similar list to that described above will also be sent in early 2006 to key industrial stakeholders who will be asked to comment on the proposed content of the new laboratories with particular regard to the skills required by the chemical industries. Contact with Astra Zeneca has already been established in this regard. Changes to the new laboratories will be considered on the basis of the feedback obtained, and companies will be asked to consider sponsorship in terms of the costs of chemicals, equipment and instrumentation for experiments of special relevance to them.

(iii) Instrument manufacturers: A number of instrument manufacturers have been, and will be, approached with regard to seeking arrangements whereby state-of-the-art instrumentation can be installed in the teaching laboratories that might otherwise be beyond the scope of the ChemLabS budget. Sponsorship for all aspects of safety in the laboratories is also being sought.
9. Dissemination

Dissemination activities form an integral part of Bristol ChemLabS. We have sought to publicise our activities as widely as possible during the initial planning and development phases of the project in order to promote consultation with bodies outside the School of Chemistry. The views of stakeholders will be of great importance in ensuring the success of the project. Furthermore, we are committed to disseminating the results of our work as widely as possible so that others, both from within the University of Bristol and from further afield, may benefit.

(i) Stakeholders Conference: The first Bristol ChemLabS Stakeholders Conference was held on 16th May 2005 as part of the launch of the CETL project. The meeting was well attended, with representatives from the chemical and wider education sectors and from industry and other employers. Professional bodies such as the Higher Education Funding Council for England, Royal Society of Chemistry and South West of England Regional Development Agency were also represented. Partners in the project, along with staff, students and alumni from the School of Chemistry and others from within the University, took the opportunity to find out more about the Bristol ChemLabS project.

The meeting began with a welcome and introduction from Professor Guy Orpen, Chair of Bristol ChemLabS and Professor Patricia Broadfoot, Pro-Vice Chancellor at the University of Bristol with particular responsibility for education. The Bristol ChemLabS Chief Executive, Dr Nick Norman, outlined the vision behind the project, giving delegates a preview of some of the plans for the refurbishment of the undergraduate teaching laboratories.

A series of discussion workshops were held after lunch, with representatives able to find out more about elements of the project such as Outreach activities, laboratory course content and the development and use of the Dynamic Laboratory Manual and Electronic Laboratory Notebook. As expected, these workshops proved to be very valuable, with the ideas generated by stakeholders being fed back to the various working parties to help in planning and development.

Bristol ChemLabS Stakeholders Meetings will be regular events, giving interested parties a chance to review progress in the project and an opportunity to continue to influence and shape its direction.

(ii) Website: We have established a Bristol ChemLabS website, which may be accessed directly www.chemlabs.bris.ac.uk or via the School of Chemistry homepage www.chomp.bris.ac.uk. The website allows us to provide up-to-date news about the ChemLabS project in general and our Outreach activities in particular, as well as contact details for key members of staff.

(iii) Newsletter: The first edition of the Bristol ChemLabS Newsletter was published in January 2006. The newsletter, which will be published every six months, will be distributed to stakeholders, including contacts from primary and secondary schools, from further and higher education and from industry. It is also being distributed to University of Bristol Chemistry alumni.

(iv) Outreach Activities: Tim Harrison recently gave a presentation on the Bristol ChemLabS Outreach activities at a conference organised through The Higher Education Academy Physical Sciences Centre Conference held at the University of Warwick. It was attended by around forty delegates from British universities. The Bristol ChemLabS Outreach activities were also presented at the Science on Stage meeting of representatives of science education from 33 countries at CERN, Geneva in November 2005.
(v) Meetings and Conferences: Opportunities to publicise the Bristol ChemLabS project have included meetings with staff from HEFCE, the Swedish National Agency for Higher Education, the Danish Evaluation Agency and the UK Higher Education Academy. Bristol ChemLabS representatives have also promoted the project at a number of events organised by the Royal Society of Chemistry’s Education Division and the University of Bristol’s Learning & Teaching Support Service as well as through attendance at the CETLs Network Event.

The Bristol ChemLabS team have also met with the Stephen Williams, MP for Bristol West, to discuss the aims of the project and the impact that it will have on promoting the teaching of chemistry. The team had the opportunity to demonstrate the important role that the Bristol ChemLabS project will play in supporting and sustaining the teaching of one of the subject areas that the government has identified as strategically important, yet vulnerable.
Appendix 1

Bristol ChemLabS Management Board Remit and Membership

The Bristol ChemLabS Management Board will have overall responsibility for all matters relating to the running of Bristol ChemLabS including oversight of the performance of Bristol ChemLabS against the objectives, deliverables and milestones set out in the original bid. It will meet quarterly and will receive reports from the Chief Executive, the Director and the Outreach Director.

The Bristol ChemLabS Chief Executive (CE) will be responsible to the Bristol ChemLabS Management Board for delivery of its objectives, including its financial performance. The CE will be a seconded senior member of academic staff in the School of Chemistry (SoC) and will become ex officio a member of its senior management and its (most senior) Planning Committee. The CE will lead external relations of Bristol ChemLabS with the School of Chemistry, the Faculty of Science, the University and its other departments, the Teaching Support Unit (TSU), the Learning Technology Support Service (LTSS) and the Graduate School of Education (GSoE), as well as the range of external partner organisations working with Bristol ChemLabS, including the Higher Education Academy (HEA) and the Royal Society of Chemistry (RSC). The Bristol ChemLabS Director will be a seconded experienced member of staff in the School of Chemistry and will lead the development of all educational matters to do with Bristol ChemLabS and be responsible for the management of its core staff with the assistance of the Bristol ChemLabS Manager. The Bristol ChemLabS Outreach Director will be responsible for all matters relating to Outreach activities with schools and other organisations. The financial and other administration of Bristol ChemLabS will be overseen by the School of Chemistry through its Director of Administration and the University Finance Office and will therefore be subject to the robust and established accounting, audit and monitoring processes of the University.

The Board will report to the University through the Faculty of Science and to HEFCE, the HEA and other stakeholders. The membership of the Board (see below) will be largely Bristol-based but will include representation from key external partners, notably the HEA. The membership is designed to include executive and other senior members of Bristol ChemLabS (notably its Chief Executive, Director, Manager, Outreach Director and Teaching Laboratory Managers, together with senior members of the management team of the School of Chemistry (its Head, Directors of Administration, Undergraduate Studies and Graduate School) and students (undergraduate and postgraduate), as well as key University staff from outside Chemistry (the Faculty Education Director, Director of the TSU, Chief Executive of the University’s other CETL, GSoE staff).

Membership

Chair: Head of School of Chemistry
Professor A G Orpen (SoC) (Chair)

Bristol ChemLabS Chief Executive
Dr N C Norman (SoC)

Bristol ChemLabS Director
Dr P J Wyatt (SoC)

Bristol ChemLabS Outreach Director
Dr D E Shallcross (SoC)

Bristol ChemLabS Manager
Dr D M Smith (SoC)

School of Chemistry Director of Administration
Dr D W Thompson (SoC)

School of Chemistry Director of Undergraduate Studies
Dr P J Wyatt (SoC)

Director of Graduate School of Chemistry
Professor C L Willis (SoC)

Teaching Laboratory Managers
Dr T M Obey (SoC)
Dr T J Podesta (SoC)

Student representatives (from SSLC and GSC)
Mr J Elsworth (PG, SoC)
Miss J Vickery (UG, SoC)
Miss J Howells (UG, SoC)

Director, University of Bristol Teaching Support Unit
Ms G Clarke (TSU)

Faculty of Science Education Director
Mr J Bailey (SoGS)

Senior representative of Graduate School of Education
Dr S Erduran (GSoE)

Representative of HEA Subject Centre in Physical Sciences
Mr P Chin (HEA)

Chief Executive of the University of Bristol AIMS CETL
Dr J Harris (Physiology)

University Academic e-Learning Adviser
Dr B Miller (DoCVS)

PG = postgraduate, UG = undergraduate, GSoE = Graduate School of Education, HEA = Higher Education Academy, SoGS = School of Geographical Sciences, SSLC = Staff-Student Liaison Committee, GSC = Graduate School Committee, AIMS = Applied and Integrated Medical Sciences. DoCVS = Division of Clinical Veterinary Science.
Bristol ChemLabS Advisory Board Remit and Membership

The Bristol ChemLabS Advisory Board will advise the Management Board on strategic matters and review the activities of Bristol ChemLabS in annual meetings and through receipt of the Bristol ChemLabS Annual Report prepared by the Chief Executive. The Advisory Board will be chaired by the Pro-Vice Chancellor for Education and will meet jointly with the Management Board. It will be composed of senior members of the University (the Pro-Vice-Chancellor for Education and the Dean of the Faculty of Science), representatives of key stakeholders and senior members of partner organisations (see below).

Membership

Pro-Vice Chancellor for Education, University of Bristol  Professor P M Broadfoot (Chair)
Dean of Faculty of Science, University of Bristol  Dr W G Boyd
Royal Society of Chemistry  Ms L Steele
Chemical Industries Association  Dr A Khandelwal
Society of Chemical Industry  Mr A Ladds
School of Chemistry Industrial Advisory Board  Dr D Lathbury (AstraZeneca)
School of Chemistry Teaching Advisory Board  Mr T G Harrison, (Rednock School)
Chair of HCUK (Heads of Chemistry UK)  Professor A G Orpen
Students’ Union President, University of Bristol  Mr G A Dolle (UBU)

Bristol ChemLabS Laboratory Working Party Membership

Bristol ChemLabS Director  Dr P J Wyatt (Chair)
Bristol ChemLabS Manager  Dr D M Smith
Inorganic and Materials Chemistry Section  Dr J P H Charmant
Inorganic and Materials Chemistry Section  Dr C A Russell
Organic and Biological Chemistry Section  Dr R J Cox
Organic and Biological Chemistry Section  Professor T C Gallagher
Physical and Theoretical Section  Professor A J Orr-Ewing
Physical and Theoretical Section  Dr D J Riley
Analytical Chemistry  Professor R P Evershed
School of Chemistry Director of Administration  Dr D W Thompson
School of Chemistry Director of Computer Support  Dr C M Western
Teaching Laboratory Manager  Dr T M Obey
Teaching Laboratory Manager  Dr T J Podesta

Bristol ChemLabS Buildings Working Party Membership

Head of Physical and Theoretical Section  Professor M N R Ashfold (Chair)
Bristol ChemLabS Director  Dr P J Wyatt
Organic and Biological Section  Dr R J Cox
School of Chemistry Director of Computer Support  Dr C M Western
Teaching Laboratory Manager  Dr T M Obey
Teaching Laboratory Manager  Dr T J Podesta
Senior Teaching Laboratory Technician  Mr S Croker
### Appendix 2

#### Table 1. Outreach activities, visits and meetings

<table>
<thead>
<tr>
<th>Event</th>
<th>Date(s)</th>
<th>Location</th>
<th>Number of Participants</th>
<th>Age Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show and Do Teacher Training</td>
<td>9(^{th}) May</td>
<td>School of Chemistry</td>
<td>14 teachers</td>
<td></td>
<td>Demonstrating exciting chemistry practicals I</td>
</tr>
<tr>
<td>Chemistry On-line Quiz</td>
<td>1(^{st}) June</td>
<td>Rednock School</td>
<td>~100</td>
<td>13–14</td>
<td>Chemistry quiz pilot</td>
</tr>
<tr>
<td>Summer School for Visually Impaired Students</td>
<td>25(^{th}) to 30(^{th}) June</td>
<td>University of Bristol</td>
<td>~20-80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Show and Do Teacher Training</td>
<td>1(^{st}) July</td>
<td>School of Chemistry</td>
<td>8 teachers</td>
<td></td>
<td>Demonstrating exciting chemistry practicals II</td>
</tr>
<tr>
<td>ALCOPOPS</td>
<td>5(^{th}) July</td>
<td>School of Chemistry</td>
<td>14</td>
<td>16–18</td>
<td>Trial of Post 16 Practicals</td>
</tr>
<tr>
<td>The National Academy for Gifted and</td>
<td>25(^{th}) July to 5(^{th}) August</td>
<td>School of Chemistry</td>
<td>20</td>
<td>14–16</td>
<td>Summer School</td>
</tr>
<tr>
<td>Talented Youth (NAGTY) Summer School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sutton Trust Summer School</td>
<td>4(^{th}) September</td>
<td>School of Chemistry</td>
<td>~20</td>
<td>14–16</td>
<td>Summer School</td>
</tr>
<tr>
<td>BA Science Festival</td>
<td>5(^{th}) to 8(^{th}) September</td>
<td>Trinity College, Dublin</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>OCR GCSE 21st Century Science Teachers</td>
<td>9(^{th}) September</td>
<td>Nottingham Airport</td>
<td>—</td>
<td>14–16</td>
<td>Meeting to look at changes in National curriculum effective 09/06.</td>
</tr>
<tr>
<td>Spectroscopy Tours</td>
<td>First three weeks of September</td>
<td>School of Chemistry</td>
<td>500</td>
<td>16–18</td>
<td>Eight days with around Chemistry students looking at NMR, MS, IR, XRD, SEM</td>
</tr>
<tr>
<td>Royal Institution Express Yourself Final</td>
<td>23(^{rd}) September</td>
<td></td>
<td>3</td>
<td>16–18</td>
<td>Final of competition with 'Climate Change in the Classroom' Project</td>
</tr>
<tr>
<td>Event</td>
<td>Date(s)</td>
<td>Location</td>
<td>Number of Participants</td>
<td>Age Range</td>
<td>Description</td>
</tr>
<tr>
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<tr>
<td>Visit to Department of Chemistry, University of Nottingham</td>
<td>6th October</td>
<td>University of Nottingham</td>
<td>—</td>
<td>—</td>
<td>Discussions about collaboration on primary and secondary Outreach</td>
</tr>
<tr>
<td>Visit to Wallop Defence Systems</td>
<td>11th October</td>
<td>Middle Wallop, Hampshire</td>
<td>—</td>
<td>—</td>
<td>Workshop on explosives, and general discussion</td>
</tr>
<tr>
<td>Meeting with Dan Persaud, NAGTY Summer School Coordinator</td>
<td>13th October</td>
<td>University of Warwick</td>
<td>—</td>
<td>—</td>
<td>Discussion of one day/week-end NAGTY</td>
</tr>
<tr>
<td>Ten Beautiful Experiments, lecture by Philip Ball</td>
<td>13th October</td>
<td>University of Warwick</td>
<td>—</td>
<td>—</td>
<td>Lecture observed with a view to incorporating it into future school conferences; liaison about Outreach</td>
</tr>
<tr>
<td>Meeting with Dr June Tweeny, Regional Science Director of the Open University South West</td>
<td>18th October</td>
<td>School of Chemistry</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Meeting with Prof John Holman, Director of the National Science Learning Centre</td>
<td>19th October</td>
<td>Science Learning Centre, York</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Visit from Dr Annie Hodgson, Chemistry Department, University of York</td>
<td>19th October</td>
<td>University of York</td>
<td>—</td>
<td>—</td>
<td>Discussion of gifted &amp; talented school students</td>
</tr>
<tr>
<td>Meeting with RSC seconded teacher</td>
<td>21th October</td>
<td>School of Chemistry</td>
<td>—</td>
<td>—</td>
<td>Discussion of participation in National Chemistry Quiz, sharing of Outreach activities and attendance at next national conference in June 06</td>
</tr>
<tr>
<td>Visit by Dr Kate Burrell, RSC AimHigher National Coordinator</td>
<td>24th October</td>
<td>School of Chemistry</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Ambassador Training</td>
<td>25th October</td>
<td>School of Chemistry</td>
<td>25 postgraduates</td>
<td>—</td>
<td>SET/Ambassador training workshops</td>
</tr>
<tr>
<td>Meeting with Dr Andrew Marsh, University of Warwick</td>
<td>27th October</td>
<td>University of Warwick</td>
<td>—</td>
<td>—</td>
<td>Discussions about possible collaboration on primary and secondary Outreach</td>
</tr>
<tr>
<td>Meeting with Vicky Barwick, Laboratory of the Government Chemist</td>
<td>31st October</td>
<td>School of Chemistry</td>
<td>—</td>
<td>—</td>
<td>Preparatory meeting for teacher workshops in 2007</td>
</tr>
<tr>
<td>Event</td>
<td>Date(s)</td>
<td>Location</td>
<td>Number of Participants</td>
<td>Age Range</td>
<td>Description</td>
</tr>
<tr>
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<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Nuffield Bursary Scheme 05</td>
<td>31st October</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>RSC Top of the Bench Local Area Heat</td>
<td>7th November</td>
<td>School of Chemistry</td>
<td>30</td>
<td>11–13</td>
<td>Ten teams from nine schools</td>
</tr>
<tr>
<td>Chemistry Conference Chemistry Week</td>
<td>9th November</td>
<td>School of Chemistry</td>
<td>420</td>
<td>11–13</td>
<td>Demonstration lectures</td>
</tr>
<tr>
<td>Chemistry Conference Chemistry Week</td>
<td>16th November</td>
<td>School of Chemistry</td>
<td>240</td>
<td>11–13</td>
<td>Demonstration lectures: Overspill</td>
</tr>
<tr>
<td>Science on Stage</td>
<td>21st to 25th November</td>
<td>Geneva</td>
<td>—</td>
<td>—</td>
<td>Multinational teaching and science conference at CERN</td>
</tr>
<tr>
<td>Perfume Chemistry Workshop Trial</td>
<td>26th November</td>
<td>Badminton School</td>
<td>15</td>
<td>16–18</td>
<td>Full day Saturday workshop</td>
</tr>
<tr>
<td>Launch of 'Shape the Future'</td>
<td>28th November</td>
<td>Science Museum, London</td>
<td>—</td>
<td>—</td>
<td>National launch of campaign to promote engineering and technology to young people</td>
</tr>
<tr>
<td>Structure and Bonding Workshop and Lecture</td>
<td>30th November</td>
<td>Cotham School and Redland's High School</td>
<td>36</td>
<td>15–16</td>
<td>Workshop on polymers and lecture on bonding and structure</td>
</tr>
<tr>
<td>Year 10 Structure and Bonding Workshop</td>
<td>30th November</td>
<td>School of Chemistry</td>
<td>35</td>
<td>15–16</td>
<td>Practical session followed by lecture demonstration.</td>
</tr>
<tr>
<td>Primary Science Day</td>
<td>1st December</td>
<td>St Mary's Thornbury</td>
<td>220</td>
<td>7–10</td>
<td>Whole school assembly followed by circuses of activities</td>
</tr>
<tr>
<td>Spectroscopy Tours</td>
<td>12th and 15th December</td>
<td>School of Chemistry</td>
<td>41</td>
<td>16–18</td>
<td>Spectroscopy Tours</td>
</tr>
<tr>
<td>EEF Skills Conference</td>
<td>13th December</td>
<td>Engineer's House, Bristol</td>
<td>—</td>
<td>—</td>
<td>Event to look at the promotion of engineering disciplines in schools</td>
</tr>
<tr>
<td>Training in the use of Grätzel cells</td>
<td>14th December</td>
<td>School of Chemistry</td>
<td>17</td>
<td>—</td>
<td>PCGE postgraduates</td>
</tr>
<tr>
<td>Publication</td>
<td>Date</td>
<td>Title</td>
<td>Description</td>
<td></td>
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</tr>
<tr>
<td>Higher Education &amp; Research Opportunities (HERO)</td>
<td>26&lt;sup&gt;th&lt;/sup&gt; January</td>
<td>£21m boost for teaching and learning at Bristol University</td>
<td>Announcement of HEFCE funding for Bristol ChemLabS and AIMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guardian Unlimited</td>
<td>27&lt;sup&gt;th&lt;/sup&gt; January</td>
<td>Universities share £300m to improve teaching</td>
<td>Announcement of HEFCE funding for Bristol ChemLabS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bristol Evening Post</td>
<td>28&lt;sup&gt;th&lt;/sup&gt; January</td>
<td>Cash Boost For University means 'exciting times' for science</td>
<td>Announcement of HEFCE funding for Bristol ChemLabS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBC News Website</td>
<td>28&lt;sup&gt;th&lt;/sup&gt; January</td>
<td>£21m Boost for City University</td>
<td>Announcement of HEFCE funding for Bristol ChemLabS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening Post</td>
<td>12&lt;sup&gt;th&lt;/sup&gt; February</td>
<td>Funding Supports Science Learning</td>
<td>Announcement of HEFCE funding for Bristol ChemLabS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education in Chemistry</td>
<td>March</td>
<td>HE Teaching gets cash boost at Bristol and Nottingham Trent</td>
<td>Article about HEFCE funding for Bristol ChemLabS and Nottingham Trent University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education in Chemistry</td>
<td>March</td>
<td>Fellowships for Excellence in HE Chemistry Education</td>
<td>Article about the two 2004 Teaching Fellowships, one of which went to Dudley Shallcross</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSC News</td>
<td>April</td>
<td>RSC Support for CETL bids</td>
<td>Announcement of HEFCE funding for Bristol ChemLabS and Nottingham Trent University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBC News website</td>
<td>13&lt;sup&gt;th&lt;/sup&gt; May</td>
<td>New £18m Uni Experimental Centre</td>
<td>Story on Bristol ChemLabS and the first Stakeholders' Conference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Education &amp; Research Opportunities (HERO)</td>
<td>18&lt;sup&gt;th&lt;/sup&gt; May</td>
<td>New ways to teach practical chemistry</td>
<td>Article about the first Bristol ChemLabS Stakeholders Conference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times Higher Education Supplement</td>
<td>20&lt;sup&gt;th&lt;/sup&gt; May</td>
<td>Engaging staff enjoy chemistry with public</td>
<td>Article about a University of Bristol community projec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scotsman website</td>
<td>26&lt;sup&gt;th&lt;/sup&gt; May</td>
<td>University gets £21m Cash Boost</td>
<td>Announcement of HEFCE funding for Bristol ChemLabS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publication</td>
<td>Date</td>
<td>Title</td>
<td>Description</td>
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</tr>
<tr>
<td>Higher Education &amp; Research Opportunities (HERO)</td>
<td>23&lt;sup&gt;rd&lt;/sup&gt; June</td>
<td>Tony Blair awards Bristol University teachers</td>
<td>Article about Dudley Shallcross and Tim Harrison receiving awards from Tony Blair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Education &amp; Research Opportunities (HERO)</td>
<td>6&lt;sup&gt;th&lt;/sup&gt; July</td>
<td>University offers visually impaired students chance to learn about science</td>
<td>Article about Summer School for visually impaired students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dursley Gazette</td>
<td>29&lt;sup&gt;th&lt;/sup&gt; July</td>
<td>Scientist show off skill in competition</td>
<td>Article about Year 11 students from Rednock School winning the <em>Express Yourself</em> heats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Bath website</td>
<td>8&lt;sup&gt;th&lt;/sup&gt; August</td>
<td>Bright Young Chemists visit Chemical Engineering for a Day</td>
<td>Article mentioning the Bristol ChemLabS NAGTY Summer School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialist Schools Trust website</td>
<td>31&lt;sup&gt;st&lt;/sup&gt; August</td>
<td>Closer working with higher education science college sponsors</td>
<td>Case study of the relationship between the School of Chemistry and Rednock School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education in Chemistry</td>
<td>September</td>
<td>2005 RSC Schools Education Awards</td>
<td>Article including biography of Tim Harrison and mention of Dudley Shallcross's award ceremony</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education in Chemistry</td>
<td>September</td>
<td>Chemistry gets physical</td>
<td>Article about the Bristol ChemLabS Summer School for visually impaired students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Education &amp; Research Opportunities (HERO)</td>
<td>25&lt;sup&gt;th&lt;/sup&gt; October</td>
<td>Our changing climate</td>
<td>Article about series of free public lunchtime talks by University of Bristol staff including Dudley Shallcross</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gloucestershire Gazette</td>
<td>16&lt;sup&gt;th&lt;/sup&gt; November</td>
<td>A new role for chemistry teacher</td>
<td>Article about Tim Harrison's appointment as Bristol ChemLabS School Teacher Fellow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dursley Gazette</td>
<td>December</td>
<td>School science whizzes wow Museum with work</td>
<td>Article about students representing Bristol ChemLabS at the launch of the <em>Shape the Future</em> campaign at the Science Museum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 3. Prizes and awards

<table>
<thead>
<tr>
<th>Award</th>
<th>Date</th>
<th>Holder</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSC Higher Education Award</td>
<td>23rd June</td>
<td>Dr Dudley Shallcross, Bristol ChemLabS Outreach Director</td>
</tr>
<tr>
<td>RSC Schools Education Award</td>
<td>23rd June</td>
<td>Tim Harrison, Bristol ChemLabS School Teacher Fellow</td>
</tr>
</tbody>
</table>

### Table 4. Visits to Bristol ChemLabS

<table>
<thead>
<tr>
<th>Event</th>
<th>Date(s)</th>
<th>Location</th>
<th>Visitors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bristol ChemLabS Stakeholders Conference</td>
<td>16th May</td>
<td>School of Chemistry</td>
<td>Representatives from secondary, further and higher education, industry, professional organisations</td>
<td>Presentations about Bristol ChemLabS and workshops</td>
</tr>
<tr>
<td>Visit from Carole Webb of HEFCE and Lars Geschwind of the Swedish National Agency for Higher Education</td>
<td>12th April</td>
<td>School of Chemistry</td>
<td>Carole Webb of HEFCE and a team from the Swedish National Agency for Higher Education, Department of Evaluation lead by Lars Geschwind</td>
<td>Tour of the School of Chemistry and discussion of HEFCE CETLs and how the Swedish equivalent of HEFCE might develop a similar programme of their own</td>
</tr>
<tr>
<td>Parliamentary Link Visit from Stephen Williams MP</td>
<td>16th December</td>
<td>School of Chemistry</td>
<td>Stephen Williams, Member of Parliament for Bristol West</td>
<td>Tour of the School of Chemistry and lunchtime discussion of Bristol ChemLabS and education in chemistry</td>
</tr>
</tbody>
</table>
Table 5. Presentations and demonstrations by ChemLabS staff

<table>
<thead>
<tr>
<th>Event</th>
<th>Date(s)</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>eLAN meeting</td>
<td>11&lt;sup&gt;th&lt;/sup&gt; May</td>
<td>University of Bristol</td>
<td>Presentation of the DLM by Dr Nick Norman</td>
</tr>
<tr>
<td>Joint Meeting of UK and Danish Chemistry</td>
<td>24&lt;sup&gt;th&lt;/sup&gt; November</td>
<td>Danish Evaluation Agency, Copenhagen</td>
<td>Meeting to discuss collaboration between the Quality Assurance Agency for Higher Education, UK and the Danish Evaluation Agency. Presentation on Chemistry at Bristol and the ChemLabS project given by Dr David Smith</td>
</tr>
</tbody>
</table>
| LTSS and Teaching Support Unit event       | 14<sup>th</sup> December | University of Bristol                          | 'Annual Promoting Learning and Teaching Excellence and Innovation at the University of Bristol'
                                                                 |                                                                                                 | Presentation of some preliminary DLM work by Dr David Smith and Dr John Eastman. Presentation of prizes, including to two winners from the School of Chemistry. |
Table 6. Applications for additional funding to support Outreach activities

<table>
<thead>
<tr>
<th>Funding Body</th>
<th>Initiative or Funding Call</th>
<th>Activity</th>
<th>Amount</th>
<th>Deadline Date</th>
<th>Announcement Date</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSC</td>
<td>RSC Education Initiatives Fund</td>
<td>Perfume Chemistry Day Courses 2006</td>
<td>£3750</td>
<td>November 2005</td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>RSC</td>
<td>RSC Education Initiatives Fund</td>
<td>National Chem@rt Competition 2006</td>
<td>£9400</td>
<td>November 2005</td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>RSC</td>
<td>Schools Conferences Chemistry Week</td>
<td></td>
<td>£500</td>
<td>November 2005</td>
<td>November 2005</td>
<td>Granted</td>
</tr>
<tr>
<td>RSC</td>
<td>Bristol and Bath Local Area Section</td>
<td>Top of the Bench Competition Chemistry Week</td>
<td>£700</td>
<td>November 2005</td>
<td>November 2005</td>
<td>Granted</td>
</tr>
<tr>
<td>RSC</td>
<td>Schools Conferences 2006</td>
<td></td>
<td>£2400</td>
<td>Open deadline</td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>Ogden Trust</td>
<td>Primary Science Week Visits/Activities</td>
<td></td>
<td>£3000</td>
<td>January 2006</td>
<td></td>
<td>Application turned down. In process of reapplying</td>
</tr>
<tr>
<td>The Royal Society</td>
<td>Perfume Chemistry for Young Women (Specified Science Colleges)</td>
<td></td>
<td>£3000</td>
<td>December 2005</td>
<td></td>
<td>Granted</td>
</tr>
<tr>
<td>Event</td>
<td>Date(s)</td>
<td>Location</td>
<td>Description</td>
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<tr>
<td>Informal visit</td>
<td>27th and 28th January</td>
<td>School of Chemistry, University of Leeds</td>
<td>Tour of new teaching lab facility by Dr Tom Podesta</td>
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<tr>
<td>CETLs Network Event</td>
<td>2nd March</td>
<td>Millennium Gloucester Conference Centre, London</td>
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<tr>
<td>Variety in Chemistry 2005</td>
<td>1st September</td>
<td>Department of Chemistry, University of Keele</td>
<td>Annual meeting organised by the Higher Education Academy and the RSC Education Division attended by Dr David Smith</td>
<td></td>
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</tr>
<tr>
<td>TechDis E-Learning and Disability Conference</td>
<td>27th to 28th October</td>
<td>Leeds</td>
<td>Meeting held to discuss accessibility issues associated with e-learning, attended by Dr Tom Podesta</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>eLearning Consultation Event</td>
<td>14th November</td>
<td>University of Bristol, Graduate School of Education</td>
<td>Consultation by The Learning Technology Support Service (LTSS) in collaboration with eLan (The Academic e-Learning Advisers Network) of users of new technology for teaching, assessment or student support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSC “Chemistry for our Future” event</td>
<td>30th November</td>
<td>London</td>
<td>Visit by Professor Guy Orpen and Dr Nick Norman to discuss HEFCE plans for extra funding for chemistry over the next few years</td>
<td></td>
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</tr>
<tr>
<td>Official Opening of the Fourth Floor Space</td>
<td>8th December</td>
<td>University of Bristol, Graduate School of Education</td>
<td>Presentations and workshops given by the University of Bristol Graduate School of Education</td>
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</tbody>
</table>