

# Science Centre Enrichment Activity Grant: Consortia Projects

January 2007 – March 2008

A collaboration between  
Science & Discovery Centres and schools  
across England and Wales



April 2008

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## 1. Executive Summary

In November 2006, DIUS and DCSF awarded Ecsite-uk £750,000 to demonstrate the impact of science centres, to encourage their effective collaboration and to maximize their future viability. This funding enabled Ecsite-uk to:

- Award grants totalling approximately £700,000 (including administration costs) to five consortia of 14 science centres
- Undertake a survey of the UK science centre sector and develop a future benchmarking framework
- Commission a review of science centre impact studies

This report describes the impacts of the grants awarded by Ecsite-uk to five science centre consortia as a result of a competitive bid process.

These projects aimed to engage children, parents and teachers with science, whilst enhancing and strengthening partnerships between centres, sharing best practice and allowing these centres to develop links with new and often hard-to-reach audiences.

The five projects and their consortia are listed below. The lead centre for each consortia is marked with an asterisk.

<b>Investigate-uk</b>	Developed a model for using interactive, hands-on, table-top exhibits in schools with accompanying CPD training for teachers	<ul style="list-style-type: none"> <li>• At-Bristol*</li> <li>• INTECH</li> <li>• Porthcurno Telegraph Museum</li> <li>• Science Learning Centre SW</li> <li>• Science Learning Centre SE</li> </ul>
<b>Projecting Science</b>	Developed three innovative shows that toured schools in inflatable domes, with accompanying resources	<ul style="list-style-type: none"> <li>• Thinktank*</li> <li>• Inspire</li> <li>• TECHINQUEST@NEWI</li> </ul>
<b>Joining Forces</b>	Piloted a novel transition programme for Y6 and Y7 students (as they rise from primary to secondary school) including accompanying resources	<ul style="list-style-type: none"> <li>• Science Oxford*</li> <li>• INTECH</li> <li>• Techniquet</li> </ul>
<b>Science Explorers</b>	Recruited and trained volunteer presenters to deliver new science shows in hard-to-reach schools in North Wales and East Sussex	<ul style="list-style-type: none"> <li>• Techniquet*</li> <li>• The Science Museum</li> <li>• The Observatory Science Centre</li> </ul>
<b>Northern Outreach</b>	Developed three new science shows delivered to over 20,000 students in hard-to-reach schools	<ul style="list-style-type: none"> <li>• Centre for Life*</li> <li>• Eureka!</li> <li>• MOSI</li> <li>• Ryedale Folk Museum</li> </ul>

In total, 14 science centres and museums collaborated on projects, building on existing relationships and developing new partnerships. Each consortium included both large and small centres. The consortia also included DCMS-funded museums, two Science Learning Centres and two SETpoints. This enabled the consortia to draw on and share best practice across the STEM sector as well as between geographically distinct centres.

In addition, partnerships were forged with Science Learning Centres, Local Authorities, Job Centre Plus and other organisations as a result of this project. All five consortia report that they are keen to work together in the future. Projecting Science has already begun a spin-off project as a result of this funding.

All five projects have delivered on-time and on-budget. They reached a total of 26,678 KS2 and KS3 students, and worked with 977 teachers in 358 schools. Schools from Lands End to the North Yorkshire Moors and across to North Wales were involved, including the most remote school in England. In total, the projects delivered over 33,000 face-to-face contact hours with students and teachers attending CPD sessions.

All the sessions delivered during these pilot projects were offered free of charge to schools, enabling each consortium to achieve their aim of meeting the needs of hard-to-reach audiences. While the definition of hard-to-reach varied between projects, each project met this objective.

Although not the main aim of these projects, they have all in some way enhanced the financial sustainability of the centres. In this respect, the development of new audiences cannot be underestimated as it provides a new and ongoing market for the future. The families of the 26,678 pupils reached as a result of this project may well visit the centres and thus contribute to their future sustainability. In addition, by providing new updated schools resources, this project has enabled science centres to maintain a changing programme, something that is necessary if centres are to continue to meet the changing needs of students and teachers.

A further aim of the Science Centre Enrichment and Activity Grant was to enable science centres and museums to learn from one another. Each of the projects has provided evidence of this skill sharing, ranging from sharing fundraising expertise and sharing best practice on models of working with teachers, to sharing resources and knowledge for training courses and evaluation. This project has led to the development of strong relationships between many of the centres involved in the project that will continue long into the future and lead to ongoing collaborative partnerships.



## **2. Introduction to the Science Centre Enrichment Activity Projects**

### **2.1 Background to the project**

In December 2006, Ecsite-uk was awarded The Science Centre Enrichment Activity Grant on behalf of the UK's science centres and science museums by DIUS and DCSF.

In the original proposal of October 2006, the following aims of the Enrichment Activities Project were identified:

- To encourage science centres to work more effectively together, and in collaboration with museums, STEMNET, Science Learning Centres and Science Cities
- To maximise science centres' future financial viability
- To demonstrate the impact of science centres and the added value they deliver.

These aims were addressed in three ways:

1. Piloting of enrichment activities in science centres
2. Development and roll out of a benchmarking report and tool
3. A review of science centre impact studies.

The total sum awarded was £750,000. Of this, approximately £700,000 was used to administer and deliver grants to five projects led by consortia of science centres. The remaining £50,000 was allocated to the benchmarking study and review of science centre impact studies.

This report focuses on the delivery of the consortium projects, whilst the other deliverables are reported on separately.

### **2.2 Aims of the project**

Science centre consortia were invited to submit proposals for science enrichment projects addressing two areas:

- Activities conducted on-site at science centres, targeting youngsters at the end of primary school, at the key transition point when they can 'switch off' from science
- Outreach activities conducted off-site by young enthusiastic role models, targeting areas and schools.

The aims of the proposed pilot projects were:

- to use the available funding to pump-prime development of activity formats, staff training and resource packs to allow science centres to continue running the activities beyond March 2008
- to develop resource materials for teachers, so that an outreach event or a visit to a science centre can be prepared for and then followed up and

extended with structured classroom activities directly related to students' experiences of the event/visit

- through outreach, to actively target under-represented groups
- to stimulate career aspirations, by science centre staff acting as role models
- by working collaboratively in consortia involving institutions of different sizes and geographical locations, to learn from each other, to build capacity and actively drive best practise
- to raise the profile of science centres in their local and regional communities
- by marketing the enrichment activities, to encourage visits and repeat-visits to the science centres themselves.

Each consortium was required to contain at least one organisation with annual visitor numbers between 100,000 and 3,000,000 and one with between 20,000 and 100,000 visitors per year.

### 3. Overview of the consortia projects

Applications were received from 14 consortia representing 42 centres across the UK and five consortia were awarded grants. The application process and subsequent monitoring of the grants are described in the accompanying Project Manager's Report.

#### 3.1 The five consortia

The five consortia, made up of fourteen English and Welsh science centres and museums and two Science Learning Centres are listed below. The lead centre for each consortia is marked with a \* and the smaller centres are marked with †. The projects ran from February 2007 - March 2008.

##### Investigate-uk

- At-Bristol, Bristol \*
- INTECH, Winchester
- The Porthcurno Telegraph Museum, Cornwall †
- Science Learning Centres South West and South East

##### Projecting Science

- Thinktank, Birmingham Science Museum \*
- Inspire Discovery Centre, Norwich †
- Techniquest@NEWI, Wales †

##### Joining Forces

- Science Oxford, Oxford \*, †
- INTECH, Winchester
- Techniquest, Cardiff

##### Science Explorers

- Techniquest, Cardiff\*
- The Science Museum, London
- The Observatory Science Centre, Sussex †

##### Northern Outreach

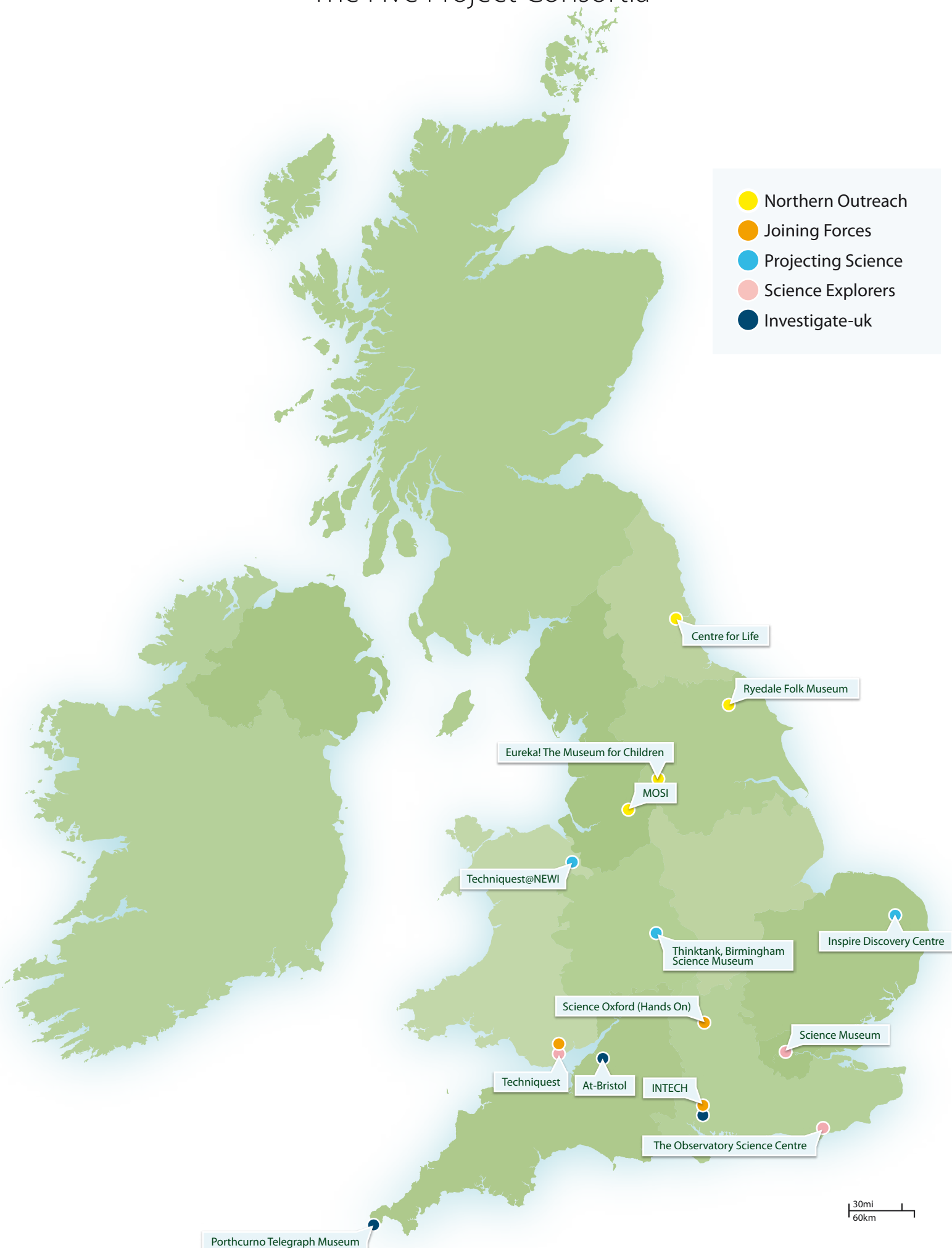
- The Centre for Life, Newcastle \*
- Eureka! The Museum for Children, Halifax
- Museum of Science and Industry, Manchester (MOSI)
- Ryedale Folk Museum, North York Moors †

Each consortium involved collaborations between small and large centres. There were also collaborations between science centres and DCMS-funded museums, independent museums and other providers such as a Science Learning Centre and STEMNET.

#### 3.2 See Maps of the 14 UK Science and Discovery Centres who partnered in the project

# Science Centre Enrichment Activity Grants

## The Five Project Consortia



- Northern Outreach
- Joining Forces
- Projecting Science
- Science Explorers
- Investigate-uk

30mi  
60km

# The UK's Network of Science and Discovery Centres

## Members of Ecsite-uk in 2007



### **3.3 A Summary of each project**

#### ***Investigate-uk***

In response to teachers' requests for more support in helping students to develop scientific enquiry skills, three sets of mobile table top interactive exhibits were developed specifically with scientific enquiry and investigation in mind. The project aimed to:

- Provide enriched learning activities for science enquiry (Sc1) and investigation at Key Stages 2 and 3
- Pilot an integrated approach to outreach by providing high quality CPD for teachers alongside classroom activities and support
- Pilot a sustainable model for taking the project to the next level and rolling it out across the UK.

*Investigate-uk* has successfully brought together students, teachers, Science Centres and Science Learning Centres to achieve an integrated and creative approach to teaching science investigation and enquiry skills at Key Stage 2 and 3. The project reached 2,270 students and 91 teachers, teaching assistants and technicians across nine targeted schools and two further untargeted feeder primary schools. The pilot project was free to the schools taking part. Instead of being charged, schools were asked to give feedback and take part in project evaluation.

#### ***Joining Forces***

All centres in this partnership were keen to run an in-reach project together that brought more school visitors into their centre. Interactive science shows for KS2 and KS3 pupils were developed and these were performed to 2,306 Year 6 and 2,465 Year 7 pupils (exceeding original collective pupil target numbers of 2,250). A total of 398 adults (teachers) participated. Two interactive science shows about forces (KS2 and KS3) were developed for this project, along with associated pre- and post-visit resources for both stages. None of the schools participating in the project were charged, and the grant also allowed the centres to cover their travel expenses. For all centres the secondary schools were recruited first, before following up with their cluster primaries.

#### ***Projecting Science***

Projecting Science was an innovative collaboration between Thinktank Birmingham Science Museum, TECHNIQUEST@NEWI and Inspire Discovery Centre. Using state of the art digital technology and inflatable domes the consortium immersed upper Key Stage 2 and lower Key Stage 3 hard-to-reach students in the awe and wonder of science. Three new interactive shows were created featuring biology, physics and astronomy enabling students to journey inside human cells or visit the stars without leaving their schools. The shows were developed using the expertise and experience of all three centres and reached a total of 21 schools (approximately 1,610 pupils and approximately 115 teachers) that often do not benefit from the experience and enthusiasm of professional science communicators. Pre- and post-visit support materials and CPD were provided to teachers to ensure both teachers and pupils received the maximum benefit from this unique learning experience.

The shows are now incorporated into the centres' outreach programmes for schools and will provide income to each individual centre in the future. Delivery will continue

as long as the show content remains relevant to the National Curriculum and the shows will act as a basis to develop future work.

### ***Science Explorers***

The partner science centres worked together to develop a model to identify, recruit, train, and evaluate a pool of parents as presenters from schools in their catchment areas. The partners aimed to develop and pilot a new outreach model and accompanying training programme for presenters that did not depend on using core staff to present shows in schools and the community.

They chose the theme of scientific enquiry. Primary teachers with no science background beyond GCSE/O Level traditionally find this aspect of the KS2 National Curriculum difficult to teach. As this was a pilot project to identify and recruit non-science centre presenters to present an outreach show, the schools that participated were not charged for receiving the show.

### ***Northern Outreach***

Northern Outreach took interactive, curriculum-linked science shows to schools in the North of England that had previously not taken STEM enrichment activities. The shows were followed up with CPD for teachers to transfer skills and demonstrations from the shows to teachers for on-going use within their schools. The project targeted upper primary/lower secondary children.

The partnership involved four diverse institutions united in their interest in hands-on science learning: MOSI, a major science and technology museum; Eureka!, a children's museum; Centre for Life, a large hands-on science centre and Ryedale, a small rural folk museum. All had worked with at least one other partner before, but never all together. As part of this project a new show on Forces was also developed.

Northern Outreach reached **221** hard-to-reach schools and **17,547** children. Participants feel this has been a rewarding and far-reaching project, and the consortium continues to work in partnership as they seek funding for future projects.

### **3.4 Evaluation and analysis**

The five individual project reports accompany this overview. The projects were very different from each other, playing to the strengths of their consortium members and addressing specific needs of both their audiences and science centres.

All partners have demonstrated the impact, innovation, engagement and delight in science that can be achieved right across England and Wales with this limited funding. They have shown how science centres can deliver locally to a national strategy and inspire the next generation with science.

#### ***Impact of the consortia projects on schools, students and teachers***

The project reports highlight that the consortia have successfully provided inspiring STEM curriculum enrichment opportunities for 26,678 children in 358 schools across England and Wales via the science and discovery centre network. In addition, this project has worked with 977 teachers in England and Wales including targeted science-related CPD.

During this project, the consortia have also recorded the number of contact hours, defined as the length of contact with the pupils multiplied by the number of pupils (or teachers for CPD).

Since engagement can happen in a range of ways, from the wow factor and immediate excitement and impact of a 40-minute science show, to a more in-depth reflective investigative study of over perhaps three consecutive one-hour visits, this measure is perhaps a more accurate reflection of the impact of the project than the measure of number of pupils reached. Overall, the projects spent 33,000 contact hours with pupils and teachers.

Table 1 includes a summary of the reach of each project.

Northern Outreach for example delivered to 17,547 pupils, including those in England's most remote school, and Investigate-uk provided in-depth and supported Continuing Professional Development (CPD) to 91 teachers in partnership with the Science Learning Centres South West and South East.



<b>Consortium member</b>	<b>Pupils reached</b>	<b>Schools visited</b>	<b>Teachers reached</b>	<b>Contact hours</b>
<b>Projecting Science</b>				
Thinktank Inspire TQ@N	1,610	21	115	1,100
<b>Joining Forces</b>				
Science Oxford INTECH Techniquet	4,771	79	398	10,338
<b>Science Explorers</b>				
Techniquet The Science Museum* The Observatory Science Centre	480	26	18	400
<b>Northern Outreach</b>				
Eureka! Centre for Life** MOSI Ryedale Folk Museum	17,547	221	355	13,160
<b>Investigate-uk</b>				
At-Bristol INTECH Porthcurno Telegraph Museum	2,270	11	91	8,000
<b>Totals</b>	<b>26,678</b>	<b>358</b>	<b>977</b>	<b>32,998</b>

Table 1 – The consortia’s reach into schools

The consortia were also asked to target hard-to-reach schools. The definition of hard-to-reach depends on the circumstances of each centre. For Porthcurno Telegraph Museum and Techniquet, this included remote, rural and small schools, while for At-Bristol this include city schools with high proportions of BME students. For others it simply included schools that had never visited before.

Indeed, in the case of Projecting Science, one clear aim of the project was to shift the emphasis from serving only the schools that are proactive in engaging with the centres to providing a special service to those that have more difficulty.

Offering some workshops free of charge to these hard-to-reach schools during this pilot phase has been beneficial to the schools taking part. They immediately accepted all that was on offer and it was clear that the DIUS and DCSF funding specifically enabled this.

Centres will look for further funding so that hard-to-reach schools might still have access to these valuable resources now there is a proven need and desire.

As might be expected, research shows that schools expect venues to understand the needs of schools and students (eg 'Out of school trips', QA Research 2008). In addition, most school trips have a direct link to the National Curriculum. Hence it is necessary that both the in-reach and outreach projects properly consider and incorporate the needs of teachers and students. The evaluation conducted by the consortia considered feedback from both teachers and students. The students' responses to the experiences were overwhelmingly positive, with many commenting on how they enjoyed the practical nature of workshops, and that they found the shows interesting and enjoyable. Teachers repeatedly commented on the benefits of the experiences being interactive and the variety of equipment brought into the schools. The Joining Forces project attempted to measure increase in knowledge and changes in the ability of students to contextualise knowledge between the first and second interaction. Early indications show that the repeat visit did make a small difference to factual recall after seeing two science shows.

### ***Collaboration***

Like museums, science and discovery centres frequently collaborate on projects. Several of the consortia are built on the foundations of previous collaborations. For example, Northern Outreach had four partners: the Centre for Life, Eureka!, MOSI and Ryedale Folk Museum. Each of the four partners in the Northern Outreach consortium had an existing relationship with at least one of the others. However, this was the first time the partners had all worked together. They also worked with Science Learning Centres, LEAs and with Science Cities.

Similarly, Joining Forces brought together centres that had worked together in the past, or had other existing relationships. Techniquet and Science Oxford had worked together on Ecsite-uk and British Interactive Group (BIG) projects. Science Oxford and Intech are both SETPOINTS and have worked together on primary school outreach projects such as Discovery South East.

Other projects, such as Science Explorers, brought together partners who had never worked together before, whereas in a smaller venue, staff have a wider variety of responsibilities. This also brought challenges for the collaboration, particularly the length and timing of project meetings and periods of collaborative programme development. While for a larger venue losing two staff for a day is a minor impact, for The Observatory, with eight FTE staff, this clearly has a much larger impact. As a result, the consortium had to be flexible, and break up the time they were due to work together into shorter blocks, and to hold more meetings at The Observatory than originally planned.

One of the many positive outcomes of this project, is that all five consortia report that they are keen to continue working with their consortium in the future.

### ***Sharing best practice***

The science centres and museums within each consortium have worked closely together throughout this project, learning from one another and sharing best practice. During the grant application process, Ecsite-uk proposed that the consortia should consist of both larger and smaller centres. The aims of this were twofold: firstly to ensure that all science centres were encouraged to apply for funding, secondly to encourage a wider range of partnerships between science centres.

As a result, during this project, the smaller science centres with just a few staff have acquired skills from larger centres with hundreds of staff.

A good example is the Science Explorers project. Staff from The Observatory Science Centre, Herstmonceux (a relatively small centre) learnt from the methods used by Techniquet to develop new shows and supporting resources. The staff at The Observatory Science Centre had never previously developed pre- and post-visit materials for their shows and workshops. Staff members from The Observatory were placed within Techniquet for two short periods during the development of resources. In particular, they looked at ways of involving teachers in the development of such programme resources. Techniquet second teachers (in this case one teacher, for one week) during the development of new programmes and resources, to ensure the needs of teachers and pupils are met before, during and after visits to the centre. The Observatory Science Centre has now applied for an Awards for All Grant to enable it to work with teachers to refresh and to develop further pre- and post-visit resources for its existing programmes.

Although it might seem natural that most of the learning between the centres in this project would flow from larger to smaller centres, as a result of this project, large and small centres have found they have much in common. In many cases they have clearly presented evidence of bi-directional learning, with larger centres learning about the creativity of approach employed by the smaller centres.

For example, despite clear differences in size and audience profile, the members of the Projecting Science consortium had one thing in common: they had all previously run schools outreach programmes. In addition, they had all identified the need to expand their outreach provision. The project was developed to build on both this common knowledge and common aim. However, by working together, they were also able to share specialist knowledge and experience held within each centre.

TECHINQUEST@NEWI and Inspire had experience of running outreach programmes with inflatable domes. Thinktank brought specialist knowledge of cell biology and planetarium equipment, but had not attempted an outreach project using planetaria before. As it has a planetarium on site, it wished to expand on the success of this, making it available to more schools. Inspire and TECHINQUEST@NEWI had previously developed outreach shows on light and colour, which Thinktank had not.

One of the highlights for the consortia has been the success of the larger meetings involving participants from all 14 centres, allowing opportunities for sharing ideas and skills between the projects.

The first network meeting was held at the beginning of the competitive application process, and was attended by eighteen different organisations introducing participants to the aims of the scheme, and giving them time to work together on their applications.

The second network meeting was held in September 2007 at the BA Festival of Science in York for the project partners. Each of the five SCEAG consortia presented their projects to date, highlighting areas of success, along with areas they have found more difficult. This enabled each consortium to learn from the others, and share ideas and best practice.

Many of the pre- and post-visit resources for these projects will also be made freely available to all other centres within the UK network through the consortium websites.

### ***Innovation***

The projects developed by the five consortia were all pilot projects, each with a difference focus. While some projects built on previous best practice, and shared these skills more widely, several projects wanted to explore new models of working with schools.

Investigate-uk aimed to explore the benefits of leaving a small hands-on exhibition in school for two weeks. The exhibits were designed to be very portable, and fit in the back of a car. They also aimed to enable students to apply knowledge and skills learnt in one subject to others, reinforcing learning and building confidence. Science centre staff ran one session with the resources, and teachers were offered CPD about how to get the most out of the resources. Teachers then delivered subsequent sessions. The evaluation of this project has proved very positive, and At-Bristol and Porthcurno Telegraph Museum are now seeking further funding to develop new sets of portable exhibits.

In contrast, the Science Explorers project aimed to increase the number and quality of outreach experiences offered by the centres by recruiting and training two new sets of volunteers (parents and Science and Engineering Ambassadors). Many science centres and museums currently have volunteer programmes, but these volunteers normally work within the venue. The volunteers recruited for the Science Explorers project would deliver science shows either in areas too far from the centre for schools to visit in a day (Techniquet) or in schools locally and hence expand the capacity of a smaller centre (The Observatory Science Centre).

In another example, Joining Forces developed structured programmes aimed at the transition between Y6 and Y7. Organisations that provide learning outside the classroom experiences, or curriculum enrichment opportunities in school are increasingly focussing on progression. This is particularly important if Learning Outside the Classroom providers are to encourage and properly support repeat visits, something that benefits them and the students. The Joining Forces project developed two linked programmes about forces, one for Y6 pupils and one for Y7. The team carefully planned, tested and revised the science shows so that they relate to the curriculum at each level, and the second show builds on the first.

### ***Improving financial sustainability***

One of the aims of the Science Centre Enrichment Activity Grant was to move towards maximising science centres' future financial sustainability. Whilst that was not a key aim of this deliverable, each of the project reports details whether and how these projects have enhanced their ongoing viability.

To set the direct financial contribution this funding made in context, the 16 partners involved in the five consortia need to be considered (14 individual centres as two partners were in two consortia). Each project consortium received between £98,000 and £138,000. Each centre therefore received a portion of this amount (£20K - £50K) depending on their agreed deliverables.

The impact this funding has made to an individual centre depends greatly on the turnover of the institution. The turnover of the centres involved in the projects ranges from approximately £100,000 - £6 million (see Table 2). Thus whilst £20,000 for the smaller centres represents a sizable proportion of the revenue for 2007, a £40,000 grant equates to just 0.67% of the Science Museum's £6 million revenue. It should also be noted that these grants were for project delivery with no allocation to core (operational) costs.

Aside from the direct contribution this funding has made to science centres, it is useful to consider the wider and long-term impact of these projects. For example, the Science Explorers project was a starting point for new outreach work for both Techniquest and The Observatory Science Centre. By working together and learning from the Science Museum's experiences, a relatively small amount of funding enabled these centres to quickly establish a new outreach programme and model of working. Within the short timescale of these projects it is hard to gauge the long-term financial impact of this project, but it is clear that neither of these venues would have been able to achieve so much, so quickly without this pilot funding.

Science centres attract and maintain school audiences by developing schools programming that changes to reflect changes in the curriculum, and in science. Projecting Science has enabled each centre to develop three new programmes in the time they would normally develop one. It has also enabled some of the partners to gain a cell biology show that they would never normally have commissioned, enabling them to diversify their target market. The Projecting Science consortium is also actively seeking further funding to enable the collaboration to continue and to grow. It has recently received £21k from STFC to develop a further secondary school outreach programme, again to be shared and owned by the group.

The development of new audiences cannot be underestimated and it provides a new and on-going market for the future. In one particular case, Science Oxford (a very small centre), increased schools visits by 117% as a result of this project. The positive evaluation reports from the teachers involved with these visits is very likely to have a vital impact on long-term sustainability. Furthermore, if the families of the 26,678 pupils involved in this project visited science centres as a result of the project, these visitors would contribute to a growth in the all important weekend and holiday visitors to the centres, thus contributing further to the future sustainability of the centres.

The Projecting Science consortium has also identified an increase in visitors across their venues in Spring 2008 compared with Spring 2007. By building relationships with schools that did not already use science centres and museums to enrich their curriculum, the team hoped that teachers within the schools would be more likely to book visits to the centres, enhancing the science centres' income from school visits.

The evaluation reports produced by the projects will provide them with valuable evidence of the immediate impact of these programmes, further supporting the case for funding of future projects. Several of the projects aim to seek additional funding from corporate, charitable and public sector sources to continue to offer the outreach projects to hard-to-reach audiences and others will aim to make the projects self-sustaining by selling them to schools who already visit (or combinations of the two).

Finally, there are of course the resources, equipment and intellectual property that are a legacy of these projects and are owned by the consortia. These will go on to generate revenue or as a basis for future funding. The small science centre Inspire, part of the Projecting Science consortium, has negotiated the IPR for the animations and will look to licence these to other users.

Consortium member	Total annual No. visitors	Total annual No. schools visitors	No. FTE staff	Annual Income - £	Total annual No. schools' outreach visitors
<b>Projecting Science</b>					
Thinktank	280,000	53,595	64	5,224,000	17,053
Inspire	33,400	15,000	4	106,400	11,200
TQ@N	58,700	17,400	9	117,000	6,300
<b>Joining Forces</b>					
Science Oxford	9,376	2,550	14	965,143	15,000
INTECH	76,000	17,000	20	1,537,276	1,300
Techniquest	179,431	47,221	74	3,000,000	42,536
<b>Science Explorers</b>					
Techniquest	179,000	47,000	74	3,000,000	43,000
The Science Museum*	not given	not given	789	62,500,000	not given
The Observatory Science Centre	58,000	20,000	8	500,000	2,000
<b>Northern Outreach</b>					
Eureka!	230,856	32,635	50	1,000,000	not given
Centre for Life**	220,000	35,000	80	6,000,000	not given
MOSI	408,469	76,632	102	5,100,000	not given
Ryedale Folk Museum	41,032	11,028	3	229,669	not given
<b>Investigate-uk</b>					
At-Bristol	230,000	60,000	83	3,042,216	not given
Intech	76,000	17,000	20	1,537,276	1,300
PorthCurno Telegraph Museum	not given	not given	not given	not given	not given
<b>Totals 2,080,264 452,061 1,393 93,858,979 139,689</b>					
** Figures given are for all trading activities					

Table 2 – Consortium members' annual visitor and turnover data

### 3.5 Lessons learnt

Each of the accompanying reports details the lessons learnt by the consortia. Some of these lessons are likely to be particularly useful for other science centres considering similar projects.

Investigate-uk developed a project that involved leaving small exhibitions in schools. They recommend:

- Consider having multiple copies of each exhibit in the set. This would enable teachers to manage investigations more easily
- Working closely with the Science Learning Centres was very beneficial to this project. It enabled the centres to develop and deliver effective CPD sessions.

Joining forces shares useful lessons relating to setting up a transition project with schools and science centres:

- Transition projects require a long lead in time (greater than one term) in order to recruit secondary schools, and then subsequently recruit feeder primary schools
- Secondary schools should be recruited as early as possible, and agree to work on the development of the project, as well as with the feeder primary schools
- Run the project early in the summer term as this will maximise take-up by primary schools.

Northern Outreach comments on the timing of the project and how that impacted on its delivery:

- Aim to have projects synchronised with the school year. This will reduce pressure on staff and improve marketing
- Collaborations are hard to develop in such a short time. This project worked well because of previous relationships.

Science Explorers shares valuable lessons concerning the recruitment and training of volunteer presenters, including:

- When training novice presenters, whether volunteers or casual staff, science centres should use existing, well-established and thoroughly polished shows that have been performed repeatedly in front of target audiences
- Do not underestimate the length of time required to recruit volunteers who will be volunteering remotely from the science centre. At least several weeks, if not longer, needs to be allocated for volunteer recruitment
- It proved difficult to recruit sufficient volunteers for this project. It may prove easier to recruit individuals to work on a casual basis than to recruit volunteers.

Projecting Science shares lessons on the process of working collaboratively:

- The consortium recommend recruiting a project coordinator to act as an administrator, gathering information for reports, procuring the bulk of equipment and arranging travel and accommodation.
- Consider developing outline scripts and support materials at writing 'away days'. This was essential to the success of the project as it removed participating staff from the distractions of work at the centres, allowing time for creative development. The writing days also set a tone of collaboration, which was continued throughout.



### **3.6 Conclusions**

As a result of this project, fourteen science centres and museums now have new learning programmes that will continue to be used. They also have new resources, such as show props, mini exhibitions, transport for outreach programmes and inflatable domes.

For example, the three new shows developed by Projecting Science are now incorporated into the centres' outreach programmes for schools and will provide income to each individual centre in the future. Delivery will continue as long as the show content remains relevant to the National Curriculum and the shows will act as a basis to develop future work. They have already applied for and have received funding to collaboratively develop a secondary school science show, using the model outlined in their report. This funding is from STFC for £21,000.

The new pool of volunteer presenters, recruited and trained by the Science Explorers project will enable two science centres to reach 200 new schools in North Wales and East and West Sussex. The centres have effectively expanded their potential audience as a result of this project

For Investigate-uk the main legacy of the project is the evidence collected and analysed during the pilot of (for them) a new way of working with schools. They have tested and developed a model which brings the science centre to the school, and supports this with CPD for teachers. The team will use the evaluation of this project when seeking funding to expand it, and when marketing it to other schools and Science Learning Centres.

In the north of England, the relationships developed as a result of this project will provide a lasting and firm foundation for future projects. They have proved that as a group of science centres working together they can efficiently deliver a project over a wide geographic area. This model could then be rolled out in other areas of the UK.

The transition project piloted by Joining Forces provides a template for future transition projects. These centres have demonstrated the value and impact of clearly building in progression into their programme offering. By continuing to do this, they will be able to enhance the impact of future schools programmes.

## Investigate-uk

Edel Fletcher, At-Bristol

25.02.08



This Project involved the following centres:

- At-Bristol, Bristol
- Intech, Winchester
- Porthcurno Telegraph Museum, Porthcurno, Cornwall (PTM)
- Science Learning Centre South West (SLCSW)
- Science Learning Centre South East (SLCSE)

### **1. Summary of the project**

*Investigate-uk* is an outreach project that provides an integrated approach to enriched learning opportunities for science enquiry and investigation at Key Stages 2 and 3.

The project supports learning through a variety of approaches, including Continuing Professional Development (CPD) for teachers, the use of written materials, outstanding mobile exhibits and inspiring role models to engage students in the classroom.

The consortium brings together three existing networks; science centres, Science Learning Centres (SLCs), and schools, and harnesses the combined best of their distinct skills and knowledge.

*Investigate-uk* reached 2270 students and 91 teachers, teaching assistants and technicians across nine targeted schools and two further untargeted feeder primary schools. Total contact time with the target audience was almost 8000 hours.

Dissemination through the SLC network, the British Interactive Group (BIG), the Specialist Schools and Academies Trust and the Association for Science Education provided opportunities to showcase the project to a wider audience of schools, teachers and science educators.

Whilst *Investigate-uk* has not provided the consortium with a direct means of financial sustainability, it has opened doors to future funding possibilities through partnerships developed and lessons learnt and the consortium celebrates this as a success of this exciting pilot project.

## 2. Background of your consortium

The consortium comprises three science centres of differing sizes and two regional SLCs. Between the partners, a large geographical area from South East to South West UK is covered, reaching students and teachers from Sussex to the tip of the Cornish peninsula.

**At-Bristol** is a landmark Millennium project that exists to *make science accessible to all* and promote lifelong learning opportunities through its engaging exhibitions and innovative education programmes.

**Intech** is a unique, exciting interactive centre administered by The Hampshire Technology Centre Trust Ltd., with the specific purpose of promoting the knowledge and understanding of science, technology, engineering and mathematics.

**The Porthcurno Telegraph Museum**, owned and managed by the PK Trust, promotes the education and understanding of communications technologies through the science and history that underpin this exciting field.

**Science Learning Centres (SLC)** offer excellent Continuing Professional Development for science teachers and technicians across the UK.

Key skills and strengths brought to the project by each partner include;

- previous experience of working in consortia with other science centres and education providers (At-Bristol)
- experience in delivering successful outreach to schools in isolated and rural areas (PTM) and schools with a high proportion of BME students (At-Bristol)
- experience of developing portable interactives for schools (At-Bristol)
- successful application of data logging equipment to science centre exhibits and workshops for schools (Intech)
- host organisation and strong working relationship with SETPOINT Hampshire, Portsmouth, Southampton and the Isle of Wight (Intech)
- expertise in delivering high-quality CPD for teachers (SLCSW, SLCSE)

All three science centre partners have dedicated education staff, with experience in delivering innovative learning programmes, working with schools and teachers and producing high quality support resources.

Details of Consortium partners

Consortium member	Total annual number of visitors	Total annual number of schools visitors	Number of FTE staff	Annual Income	
At-Bristol	230,000	60,000	83	£3,042,216	
Intech	76,000	17,000	20	£1,537,276	1300 outreach
Porthcurno					

**3. Investigate-uk: The Project**

**3.1 The background to your project**

The *Investigate-uk* project built on an earlier collaboration between At-Bristol and SLCSW. In response to teachers' requests for more support in helping students to develop scientific enquiry skills, three sets of mobile 'table top' interactive exhibits were developed specifically with scientific enquiry and investigation in mind.

Scientific Enquiry, or the Sc1 strand of the National Curriculum, emphasises the importance of 'Investigative skills' in science. Recent changes to the science curriculum at KS3 have ensured this emphasis remains through the 'Scientific thinking' strand of its 'Key Concepts in Science'.

*'They're such open ended pieces of equipment it does fit in [to Scientific Enquiry]; that sort of task lends itself so well to investigative stuff.'* KS3/4 teacher, Cornwall

Formative evaluation, including need analysis, prototyping and student and teacher feedback informed the development of the exhibits. These were designed to support development of scientific enquiry skills; a curriculum area repeatedly raised by Key Stage 2 and 3 teachers as one that is challenging to teach. The broad themes of the exhibits (Energy, Forces, and Structures) allowed a cross-topic approach to investigation, incorporating a diversity of subjects. The aim was to enable students to apply knowledge and skills learned in one subject to others, thus reinforcing learning and increasing their understanding and confidence; an approach that is highlighted in Ofsted's '*The curriculum in successful primary schools*' report.



### 3.2 Review of Project Objectives

Original project objectives

1. To provide enriched learning activities for Science Enquiry (Sc 1) and investigation at Key Stages 2 and 3
2. To pilot an integrated approach to outreach by providing high quality CPD for teachers alongside classroom activities and support
3. To pilot a sustainable model for 'taking the project to the next level' and 'rolling it out' across the UK

The exciting interactive exhibits and National Curriculum based written resources developed by At-Bristol and SLCSW prior to *Investigate-uk* were used in the project to provide enriched learning activities for scientific investigation. 70% of teachers agreed the resources had helped achieve specific learning outcomes while the remaining 30%, although unsure of what the exact learning outcomes were, said that the resources had stimulated questions and discussion. Feedback from teachers and students has shown that students were engaged and enthusiastic, and developed positive attitudes towards science lessons as a result of the project.

*'[The exhibits were] very successful [in engaging students]. We are waiting for the final set but both sets have been absolutely fantastic for all years. So much so that when the second set arrived, I was wheeling it through the corridor and they were saying 'when do we get to have a go'. Teacher, Cornwall.*

The integrated approach *Investigate-uk* piloted involved providing CPD for teachers on how to get the most from the resources provided in the classroom in conjunction with supporting the teachers during lesson delivery. The success of this approach is summarised by one teacher;

*'You can attend many CPD courses and have people telling you what works and what doesn't. But having At-Bristol coming to the schools and putting things into practice and then supporting us to present the next session, that is what has made the project successful'. Teacher, Bristol.*

Finally, as a pilot project, *Investigate-uk* has provided the consortium with the experience, the evidence of impact and the recommendations for improvement necessary to successfully secure further funding to continue providing engaging and exciting opportunities for enriched learning in schools.

### 3.3 Detailed Project description

*Investigate-uk* has successfully brought together students, teachers, science centres and Science Learning Centres to achieve an integrated and creative approach to teaching science investigation and enquiry skills at Key Stage 2 and 3.

In response to teachers' requests for more support in helping students to develop scientific enquiry skills and as part of a previous collaboration between At-Bristol and SLCSW, three sets of mobile 'table top' interactives were developed specifically with scientific enquiry in mind.

The three sets each contain 8 interactive exhibits, a resource box and written support materials and explore the following themes:

Energy (Store it, Food Fuel, Pump it up, Under pressure, Hot or Cold, Reflect it, Seeing sound, Future fuel)

Structures (Building bridges, Making molecules, Earthquake!, Look at light, Survival, Seeing stress, Up close, Size matters)

Forces (Air stream, Orbit, Moving magnets, Liquid friction, Spin it!, Lift it up, Harmonic art, Gear it up)

Each set is truly mobile (i.e. all elements stack together, can easily be lifted by one person and can fit into the boot of a car)



A main aim of *Investigate-uk* was to pilot a sustainable model for 'taking the project to the next level' and 'rolling it out' across the UK. Evaluation was therefore key to project success and focussed on the following headings;



**Economic** – the cost effectiveness and sustainability of the model, including the potential for duplication and loan of exhibit sets on a national scale (for example, how much are the schools willing to pay?)

**Logistic** – issues regarding transportation and maintenance, and effectively reaching large target audiences

**Pedagogic** – how learning and teaching, and attitudes to science are enriched by a combined approach of support through CPD, science centre exhibits and staff, and resources.

The project had distinct phases of development and delivery, with involvement from all partners throughout each stage.

- Consortium development and planning; initial press activity
- Completion of the exhibit sets, including addition of data-harvesting function
- Development of CPD activity and support resources
- 'Train the trainers' event – for SLC and science centre staff
- Recruitment of schools
- Delivery of CPD in the three partner science centres (including evaluation activity)
- Outreach phases 1, 2 and 3 (including evaluation activity)
- Final case study and financial reporting, dissemination

The first phase of the project saw the creation and development of the consortium and the development of consortium-based strategies for skill sharing, marketing and PR, evaluation and dissemination and communication.

The CPD activity was developed by the At-Bristol staff, in collaboration with SLCSW and SLCSE with advisement from experienced teachers. A 'train the trainers' event enabled all SLC and science centre delivery staff to come together to train and share best practice in CPD delivery, and develop a mutually supportive method of working, rather than overlapping or duplicating efforts.



Each science centre was responsible for recruiting three schools for involvement in this pilot. A diverse range of schools took part in the project;

- two of At-Bristol's partner schools have a large proportion of Black and Minority Ethnic (BME) students
- all three Cornwall schools are small and located in rural and remote areas
- one of Intech's partner schools is a Science Specialist School
- one of Intech's partner schools is a Sports Specialist School
- one of Intech's partner schools is a Specialist Technology College
- catchment areas included areas of social and economic deprivation and rural and remote areas

Partner schools used the exhibits in three distinguishable ways;

- 'round robin' or 'circus-style' activity where all students in the class interacted with each exhibit for 5 – 10 minutes
- in-depth investigations where a smaller number of exhibits were used and students explored these for a longer period
- using data-logging equipment to take investigations further

*'I was quite surprised how popular the matching food and energy was. They wanted to spend longer on that. They wanted to match Mars bars to 8 hours sleep!' KS3/4 teacher, Winchester.*

Science centre staff supported delivery of the project in schools in a variety of different ways;

- engaging with students as they interacted with the exhibits and acting as inspiring ambassadors for science and science communication
- working more closely with small groups of students as they carried out investigations
- delivering training for teachers and technicians on using the exhibits
- delivering further CPD with teachers on how to use the exhibits to provide creative learning opportunities for students



Key to the project was to actively avoid the 'parachuting in' effect that outreach projects can suffer from; outreach, while exciting and engaging for students does not generally



equip teachers with the knowledge and skills required to ensure ongoing learning related to the project.

To ensure a longer-term impact each set of interactives remained in the school for two weeks, allowing all students across the Key Stage access to all exhibits, and full use of the supporting student and teacher resources.

The timetable below, drawn up at the beginning of the project, enabled all nine partner schools to access the three *Investigate-uk* kits whilst still allowing time for essential maintenance and replenishment. Each of the three science centres then managed the rotation of each kit among their three partner schools.

	At-Bristol	Intech	PTM
10th Sept – 19 <sup>th</sup> Oct	Forces	Energy	Structures
October half term	maintenance	maintenance	maintenance
5th Nov – 14 <sup>th</sup> Dec	Energy	Structures	Forces
Christmas hols	maintenance	maintenance	maintenance
7th Jan – 15 <sup>th</sup> Feb	Structures	Forces	Energy

Evaluation activity was on-going throughout the project. A single external evaluator, *Graphic Science*, was contracted to carry out evaluation of the 3 delivery stages (Train and Trainer, CPD training and School outreach delivery) to ensure a consistent approach across the project partners.

Feedback questionnaires were gathered from students in all nine schools and either the external evaluator or representatives from the science centres observed lessons in all schools. Observation protocols were agreed upon and ensured consistency across all schools.

Teachers assisted in carrying out research, particularly in recording students' attitudes to science prior to project activity and one teacher in each school took part in an in-depth interview with the external evaluators.

Questionnaires and teacher interview questions were designed and agreed by the consortium and can be found in the evaluation report attached.

A case study report has been produced and will be disseminated via the Ecsite-uk website, the SLC portal sites and the SLC management groups. The project has been presented and showcased at the British Interactive Group (BIG) conference (2007), the SLC network conference (2007), the Specialist Schools and Academies Trust (SSAT) conference (2007) and the BA festival (2007) and plans are in place to present at the BIG conference in July 2008



Summary of your project data

	Total number of participants	Number of student participants	Number of adult participants	Number of participatory hours (participants x time spent with them)	<i>Total number of schools</i>
KS1	165	150	15 teachers and teaching assistants for CPD	3 0.5-hour lessons, 165 students = <b>1800 student hours</b>  2.5-hour CPD sessions = <b>37.5 teacher hours</b>	1 (pre)
KS2	238	220	8 teachers for CPD 10 teaching assistants for CPD	1 1-hour lesson, 50 students = <b>50 student hours</b>  2.5-hour CPD sessions = <b>20 teacher hours</b>  2.5-hour CPD sessions = <b>25 teaching assistant hours</b>	2 (post) 1 (as KS1 above) (pre)
KS3	1958	1900	43 teachers for CPD	3 1-hour lessons,	6 pre

			15 technicians and teaching assistants for CPD	750 students = <b>5700 student hours</b>  2.5-hour CPD sessions = <b>107.5 teacher hours</b>  2.5-hour CPD sessions = <b>37.5 teaching assistant and technician hours</b>	2 post
<b>TOTAL</b>	<b>2361</b>	<b>2270</b>	<b>91</b>	<b>7777.5</b>	<b>11</b>

Numbers of new school and teachers reached

	Numbers
Number of schools you worked with before the project	<p><u>Intech</u> 60 schools per year through outreach</p> <p><u>At-Bristol</u> At-Bristol has 5,500 named teachers and 2000 schools from the South West and beyond on its database. This database is used to market At-Bristol's core educational offer and to target schools and teachers for special events and projects.</p> <p>Special projects allow At-Bristol to work more closely with schools and teachers and to develop in-depth partnerships. Approximately 30 schools per year are involved in a diverse range of projects with At-Bristol and many of these partnerships evolve beyond the scope of the funded projects.</p>

<p>Number of schools / students you worked with after the project</p>	<p><u>Consortium</u> The consortium has worked with 11 schools during <i>Investigate-uk</i>. Nine of these were recruited at the outset of the project while two were feeder primary schools.</p> <p>The consortium members worked very closely with the nine partner schools, and have successfully built up excellent working relationships with teachers which will certainly continue beyond the scope of the project. PTM's partner schools have already had the opportunity to get more involved with the museum by taking part in science sleepovers.</p> <p>The consortium is confident that these schools are now ambassadors for their local science centre, not only among colleagues in their own department, but in other departments where cross-curricular learning is important, and indeed in other schools.</p>
<p>What % of schools within your area have visited you</p>	<p><u>Intech</u> 400 schools per year; approximately 20% of schools within 1-hour travelling time from Intech</p> <p><u>At-Bristol</u> 97% of Bristol primary schools; 90% of Bristol secondary schools; 53% of South West primary schools; 50% of South West secondary schools</p>

Your definition of hard to reach schools

Hard to reach schools taking part in the *Investigate-uk* project have included

- Schools in rural areas (South East England and Cornwall)
- Schools in remote areas (Cornwall)
- Schools with a high proportion of BME students; Ethnic minorities have included students of Afro-Caribbean descent, Somali students and Eastern European students (Bristol)

These are students who are currently under-represented in each centres' existing visitor profiles and are under-represented for a variety of reasons including prohibitive costs and lack of understanding of what a science centre offers.

Charging for your projects

*Investigate-uk* did not charge any costs for participation in the project. As prohibitive costs are a large barrier to engaging hard-to-reach audiences, it was felt that project costs should not be passed to the schools. Schools instead were invited to take part in a pilot project and were asked to be open to providing feedback and taking part in the project evaluation.

There will be a charge in the future as more schools use the interactive exhibits developed as part of the project. These costs are yet to be agreed by the consortium but will cover costs incurred due to maintenance, delivery and collection of exhibits. Willingness to pay was investigated as part of the project evaluation and findings will form the basis of this discussion.

#### Marketing approach

All schools were recruited by each centres' education teams with support from Schools' Liaison Officers where applicable. Schools were identified using the 'hard-to-reach' criteria above and were contacted directly by email and telephone. None of the consortium partners had difficulty in recruiting schools for the project.

### **Picture of the projects across the nation**

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#### Centre and school postcodes

At-Bristol, BS1

City Academy, BS5

Bedminster Down School, BS13

Whitefields Fishponds Community School, BS16

Intech, SO 21

Costello School, RG21

Perrins High School, WR14

Westgate School, SO22

PTM, TR19

Cape Cornwall School, TR19

Alverton Community Primary School, TR18

Humphry Davy School, TR18

### **4. Impact of the Project on Partner Science Centres**

#### **4.1 Collaborations and partnerships**

Collaboration between consortium partners was at the heart of the *Investigate-uk* project. The three science centres built up a strong working relationship with each other and have enjoyed and benefited from regular project meetings and email and telephone contact. Project partners are currently looking forward to the opportunity to continue working together beyond the scope of the funded project and indeed on future projects.

Partnerships with the two SLCs were already well developed at the project outset; At-Bristol is the lead partner of the SLCSW (SLCSW is the only SLC to have a science centre partner) while Intech benefited from a close relationship with SLCSE. However, the *Investigate-uk* project has given the consortium the chance to showcase its work to the SLC network through their annual conference in York (December 2007). SLC staff from across England engaged with all three sets of exhibits and found out about the project. Discussions are now ongoing between SLCSW and the SLC network about the possibilities of expanding the project across the UK.

Intech are the host organisation for SETPOINT Hampshire, Portsmouth, Southampton and the Isle of Wight and work closely with all SETPOINTS in the South East region. The *Investigate-uk* project has allowed the continued development of a resource that these SETPOINTS will benefit from.

In addition, the STEMNET Regional Director for the South West has invited At-Bristol to profile the project by showcasing the interactive exhibits to SETPOINT co-ordinators across the South West.

#### **4.2 Driving Innovation and sharing Best Practise**

*Investigate-uk* piloted an integrated approach to providing enriched learning opportunities for science enquiry and investigation at Key Stages 2 and 3. This integrated approach was key to the project and is shared here as exemplary both of innovation and of best practice.

Science centres traditionally have offered excellent outreach to schools to help enthuse and engage students in STEM subjects. Increasingly, science centres are offering high quality CPD for science teachers, often through partnerships with their local SLCs or funded projects. However, *Investigate-uk* has found that combining both these approaches has greater benefits than either approach alone.

Outreach is often viewed as transitory, students are engaged, but its difficult to measure longer-term impact, while CPD can be forgotten when teachers get back to school. Linking the two together means teachers feel more supported and confident to engage and enthuse students themselves.

*'You can attend many CPD courses and have people telling you what works and what doesn't. But having At-Bristol coming to the schools and putting things into practice and then supporting us to present the next session, that is what has made the project successful'.* Teacher, Bristol.

### **4.3 Contribution to financial sustainability of consortium members**

*Investigate-uk* has provided the consortium members with a diverse range of opportunities that may indirectly benefit each partner in our shared long-term goal of financial sustainability. However, while these are benefits that the partners hope will open new doors to further funding opportunities the project itself cannot be shown to have resolved the financial sustainability issues of the individual consortium members.

Not least among the benefits the project has provided is the strength of the consortium itself and the future partnerships that are likely to develop from it. The current partnership has enjoyed a wealth of skills sharing and the sharing of best practice which all members have benefited greatly from and will continue to do so as the consortium works together beyond the scope of the funded project. For example, the exhibit design team within At-Bristol has greatly benefited from the experience that staff at Intech has with installing and using data harvesting to enrich and augment exhibits.

PTM in particular feel their organisation has benefited enormously from working in partnership with At-Bristol which, as a larger science centre is known in the region and has close links with the SLCSW. One direct benefit of this relationship is that PTM are embracing the need for hands-on science exhibits in future plans for an interactive gallery.

At-Bristol and Intech have not previously worked together, and it is thanks to the *Investigate-uk* project that this partnership evolved when it did. Furthermore, as a SETPOINT for Hants and the Isle of Wight Intech has provided At-Bristol with the opportunity to develop relationships within the STEM network across the South East and South West. This, in part, affected At-Bristol's recent decision to put forward a tender to host the regional West of England SETPOINT.

The partnerships with the schools that took part in *Investigate-uk* were of course crucial to the success of the project. Partnerships with schools can be difficult to forge and sustain, and certainly *Investigate-uk* allowed consortium members to either develop new working relationships with schools or to build upon already existing relationships. PTM's partner schools have already had the opportunity to get more involved by taking part in science sleepovers in the centre.

While the interactive exhibits and written materials were already developed before the start of the project, *Investigate-uk* provided the consortium with the funding necessary to pilot the model of taking these exciting resources into schools. It is based on this model that the consortium now have the experience, the evidence of impact and the recommendations for improvement necessary to successfully secure further funding to continue providing engaging and exciting opportunities for enriched learning in schools.

At this stage *Investigate-uk* cannot be shown to have provided the possibility for future revenue for consortium members. The consortium is currently exploring the costs of continuing the project; it is hoped that these costs will be covered by the hire of the interactive exhibits and resources by schools, but is unlikely to be able to offer more than this.

However, At-Bristol is currently developing relationships with the national SLC network, and it is hoped that through this network, and the possibility of securing further funding, that it may be possible to create revenue from sales of these exciting curriculum-linked resources across the UK and beyond. *Investigate-uk* has contributed to allowing At-Bristol to develop an informed business plan on how to take this ambitious plan forward and is currently in discussion with several potential funders.

PTM is also using lessons learned from the project to seek funding to develop a parallel set of exhibits illustrating the principles behind communication technology. This would provide further opportunities for At-Bristol and PTM to partner together in ongoing and sustainable projects.

In summary, *Investigate-uk* has not provided the consortium with a direct means of financial sustainability, but has opened doors to future funding possibilities through partnerships developed and lessons learnt and has successfully achieved the aims and objectives of this exciting pilot project.

#### **4.4 Press activity**

Media coverage of *Investigate-uk* was diverse and included articles written for teachers journals as well as features in Teachers' TV.

Teachers TV [www.teachers.tv/video/21628](http://www.teachers.tv/video/21628)

The first of two Teachers TV programmes featured a '*day-in-the-life*' of a local teacher who visited At-Bristol to explore ways of developing creativity in her teaching. The *Investigate-uk* resources were introduced to the teacher as a way of engaging her students with scientific investigation. The feature represented an excellent marketing tool for the use of the exhibits in the classroom and provided an excellent opportunity to showcase resources that the consortium intend to further develop beyond the scope of the project.

The second of the two Teachers' TV features cover the aims and objectives and the longer-term goals of the project in more detail.

Technology in education and Education scientist (see attached)

These are two short articles alerting teachers to a '*new consortium to bring science exhibits to classrooms across the UK*' and to the '*Pilot project set to bring mobile science exhibits to British classrooms*'. The articles describe the project and have provided opportunities to market *Investigate-uk* to a wider audience.

The Teachers' Journal

The Teachers' Journal visited *Investigate-uk* in action in a Bristol school. The journalist and photographer were excited by the project and by the engagement and learning of the pupils in particular. An article has not yet been published.

#### **4.5 Other benefits (please specify)**



## 5. Opportunities and plans for the future

### 5.1 Follow on Actions

The *Investigate-uk* consortium has outlined how the three partners will continue to work together to provide enriched learning opportunities for teachers and students. As a direct result of the project, two duplicate sets of interactive exhibits will be shared among the consortium members, and together with the curriculum-linked written materials, these exciting resources will continue to be enjoyed by schools. The consortium is currently discussing the details of this continued activity and has yet to decide upon cost to schools (to cover costs incurred).

The consortium has agreed upon a schedule for the first year of delivery and in implementing a review plan to ensure the continued success of the project.

Furthermore, both At-Bristol and PTM are already seeking further funding to develop new resources (PTM, as outlined above) and to widen the project reach through the SLC network (At-Bristol, as outlined above). At-Bristol is developing a business plan to take this exciting and far-reaching project forward.

#### Handover Plan

The consortium has agreed upon, or is in current discussion regarding the following actions to ensure the ongoing success of the project.

- Costs to schools should cover the costs to the partners incurred by transport of and maintenance of the interactive exhibits
- These costs have yet to be agreed by the consortium but must be a balance between allowing the project to be self financing while not being prohibitive for schools
- The build of the duplicate sets is ongoing and will be completed by the At-Bristol design team by the end of March 08
- At-Bristol will carry out maintenance to the exhibits, but these costs will be split equally among partners for general maintenance and will be covered by each individual centre due to breakages incurred while in their care
- General maintenance will continue to be carried out during school holidays
- A contract will be drawn up among the consortium and will be based upon the *Investigate-uk Memorandum of Understanding*
- A schedule for circulation of the resources for the first year has been drawn up and is outlined in the table below

Date	Resource set 1	Resource set 2
Summer 08	Intech	At-Bristol
Autumn 08	Intech	PTM
Spring 09	At-Bristol	PTM

- The consortium will meet to agree outstanding actions, costs, contract, recommendations from evaluation etc. in March 08
- The consortium will meet at the end of the first year of circulation of the resources to review the schedule for the following two years
- The *Investigate-uk* exhibits will circulate for three years after which time the consortium will review the project and the resources

### Post Project Review Plan

The consortium has put in place plans to meet in March 2008 in At-Bristol; an exact date has yet to be agreed. The meeting will act as a debrief of the close of the SCEAG-funded *Investigate-uk* and a kick-off to the post-funded stage of the project.

### Recommendations for Future Enhancements to the projects

The consortium intends to continue the project based on the model used in *Investigate-uk*. However, it is unclear at this stage whether costs to schools could cover CPD costs. The consortium intends to continue to work closely with the SLCs to ensure that this important part of the project is not lost. Further recommendations from the evaluation report will be discussed in March 08.

## **6. Recommendations (Lessons learned)**

### **6.1 Recommendations relating to the collaboration**

1. Strive for true collaborative working from the outset of the project
  - Identify each partners skills, strengths, resources and how each partner can benefit from the other
  - Similarly, identify any limitations that need to be considered, e.g. staff capacity, resources, etc.
  - Identify what each partner hopes to achieve through the project; this will be enlightening and help you to understand your partners' needs
  - Identify and agree clear and realistic roles
  - Consistency of project staff throughout the project allows the development of strong and lasting relationships
2. An overall Project Manager is important, but it is equally important to strive to keep all members actively involved in the project
  - Meet with consortium members regularly, and ensure meetings are hosted in different venues; this ensures all members are equal and take equal ownership of the project
  - Ensure all members feed into project developments, give feedback, raise concerns, feed into the PR effort etc. Keeping this in mind will reduce the risk of either a 'dominant partner' racing ahead, or a 'sleeping partner' not being actively involved
  - Share the hosting responsibility for key project meetings. This allows project partners to visit other partner centres to understand their needs/location/position more clearly, and also shares travelling time and costs.
3. Regular communication is vital in a consortium to ensure that all partners are up-to-date with project progress
  - Meetings are important and should happen at key milestone points throughout the project life. These should be booked in good notice to ensure attendance

- form all consortium partners, and other invited attendees e.g. external evaluators, advisors, etc.
- Phone, email and video conference (if possible) are all useful as is taking advantage of attendance at other conferences to meet up.

## **6.2 Recommendations relating to project deliverables**

Recommendations for future improvements are based on the findings of the external evaluator and on the experiences of the consortium members. Discussion is ongoing regarding future improvements to the project and will be agreed upon at the project review meeting in March 2008.

Two of the main recommendations that relate back to the aim of providing enriched learning opportunities for students and providing high-quality resources to facilitate scientific enquiry are;

- Explore the possibility of developing sets of exhibits in the future that have multiple copies of the same exhibit; this would allow teachers to manage investigations more easily. The two new sets of duplicates developed as part of *Investigate-uk* can be used together in one lesson to explore how this could work.

*'That's quite cool. That is very cool. You could do some serious investigation.'* KS3/4 Teacher, Bristol.

- Work closely with SLCs to explore the role of the CPD within the project; how will we continue to offer this?; how can we improve this so that teachers are more encouraged to use the resources creatively?

Finally, future funding will be sought to ensure the integrated approach to teaching (inspiring resources, high-quality CPD, in-school support and National Curriculum based resources) can be afforded by teachers and enjoyed by students across the UK.

*'Oh wow! We are doing those things again. I want to play with that one!'*  
Female student, year 9.

## **6.3 Assessment of project planning, delivery and other techniques used**

Project planning was hampered at the outset by initial delays due to the necessity to resubmit a reduced budget; this had a knock-on effect of delaying some of the project deliverables such as the recruitment of schools. This proved difficult to manage initially as CPD had to be fitted into a short timescale. However, the outreach stages of the project were delivered exactly as planned and all schools hosted each set of exhibits for two weeks as planned.

As the approach being used in the project was innovative and novel, i.e. going into schools to support teachers in the classroom after they had received CPD, it did prove difficult to organise. There were some instances during the project when teachers had invited science centre staff to support in specific lessons only to find that the lessons

had not actually been organised. The highlighted the need for better communication with teachers, and among teachers in a given school.

Project meetings ran regularly and smoothly, and communication within the consortium was excellent. Overall, this meant the project was delivered as planned.

#### **6.4 Analysis of Project Issues**

- Due to the necessity to resubmit a reduced budget the project was delayed from the outset; this had the knock-on effect of making milestones more difficult to reach on schedule
- Reporting structure should have been agreed at the project outset
- Delays between submitting a claim and the receipt of money caused problems with cash flow for the science centres
- Change of SCEAG focus during the project from creating a sustainable project to creating a sustainable science centre made the end of project reporting more difficult. Had this been clearer, projects could have been more effectively evaluated e.g. part of the evaluation strategy could have been to evaluate the consortium itself
- Science centre staff often arrived at schools for lessons, to find lessons had been cancelled, or not arranged; this highlights the difficulty in effectively communicating with teachers

#### **7. Evaluation report**

##### Evaluation strategy

Three stages of the project were evaluated

- Train the trainer
- CPD training
- Delivery in schools

The main requirements of the evaluation were to help inform 'taking the project to the next level' and 'rolling it out across the UK'. Thus the evaluator was asked to report on the following research strands;

- Economic – the cost effectiveness and sustainability of the model including the potential for duplication and loan of exhibits on a national scale
- Logistics - issues regarding transportation and maintenance
- Pedagogy – how learning and teaching, and attitudes to science are enriched by a combined approach of support through CPD and in-school support

Evaluation methodology included

- Observations in the classroom
- Student questionnaires
- Interviews with teachers

##### Summary of findings

###### CPD

- Best practice was the fact that teachers were allowed to explore the exhibits for themselves during CPD sessions

- Teachers liked having the opportunity to figure out the science behind the exhibits themselves; this was facilitated by the self-led exploration
- Exploring the exhibits allowed teachers to see the relevance of the exhibits to their own teaching  
*"I could use that for my A-levels. It can show more than one thing. That's really clever, isn't it?"* Teacher, South West
- However, when teachers could not see a direct application to the curriculum, they were negative towards the exhibit and moved on

#### School outreach

- Most sessions were run as a 'circus-style' event
- High levels of engagement were observed during lessons
- There was more engagement when teachers introduced the topic and discussed learning outcomes with the class
- Sessions worked better with groups of 2-3 per exhibit
- Most students enjoyed using the exhibits but many did not exhibit a clear level of understanding of the science
- KS2 groups exhibited less understanding than KS3 groups
- Worksheets were rarely used

#### Student feedback

- Students enjoyed the opportunity for practical work
- Students would have preferred more time to interact with the exhibits
- Students enjoyed lessons more than normal science lessons

#### Learning outcomes

- 11% displayed good understanding
- 55% displayed general understanding
- 34% displayed no learning

#### Teacher feedback

- The Forces and Energy exhibit sets were most successful
- Teachers felt they received the exhibits *'at the wrong time'*
- The resources were most useful for introducing a topic than an in-depth understanding
- In-depth investigation was hampered by time constraints
- Exhibits with datalogging were rarely used but teachers agreed these would be best for scientific enquiry and investigations
- Multiple copies of one exhibit would be more useful so students could focus on one class-based investigation
- Exhibits had applications across all Key Stages
- Primary teacher felt that while exhibits were more applicable to KS3 they were still of great use to KS2
- Teachers did not spend time preparing for lessons, but said they would if they were *'using them as part of the normal timetable during times when they were running the topic'*
- Most teachers were unwilling to suggest a cost they would be likely to pay as it is an *'unprecedented resource'*

- One school suggested £25, while another suggested buying some of the exhibits
- One teacher suggested '*a selection of the best*' as an option to hire
- Teachers felt that the exhibits were mobile and easy to transport

#### Recommendations

- Teachers would prefer greater availability and choice as to when they would receive the interactive resources
- Teachers are keen to use sets for investigation; this could be facilitated by the development of a class set of one exhibit as this would be easier for teachers to manage
- Worksheets in wipe-clean laminated sheets would be of benefit
- Recommended target agegroup should be KS3 and KS4
- Improve trolley wheels; make these of rubber and make them larger

**Projecting Science**

**Author: Rachel Mason, TECHNIQUEST@NEWI**

**28 February 2008**

**This Project involved the following centres (the consortium):**

- Thinktank Birmingham Science Museum
- TECHNIQUEST@NEWI, Wrexham
- Inspire Discovery Centre, Norwich

## **1. Summary of the Project**

Projecting Science was an innovative collaboration between Thinktank Birmingham Science Museum, TECHNIQUEST@NEWI and Inspire Discovery Centre. Using state of the art digital technology and inflatable domes the consortium immersed upper Key Stage 2 and lower Key Stage 3 hard-to-reach students in the awe and wonder of science. Three new interactive shows were created featuring biology, physics and astronomy enabling students to journey inside human cells or visit the stars without even leaving their schools. The shows were developed using the expertise and experience of all three centres and reached a total of 21 schools (1,610 est. pupils and 115 est. teachers) that often don't benefit from the experience and enthusiasm of professional science communicators. Pre- and post-visit support materials and CPD were provided to teachers to ensure both teachers and pupils receive the maximum benefit from this unique learning experience.

The shows are now incorporated into the centres' outreach programmes for schools and will provide income to each individual centre in the future. Delivery will continue as long as the show content remains relevant to the National Curriculum and the shows will act as a basis to develop future work.

*The Projecting Science team and inflatable planetarium*



## 2. Background of the Consortium

The Consortium centres each brought different strengths to the project. Each centre brought its own particular expertise and each was lacking expertise which could be provided by other members: Inspire and TECHNIQUEST@NEWI had extensive experience of developing and delivering inflatable planetarium shows in schools, Thinktank had experts who could develop cellular biology content and advise on planetarium equipment. The consortium allowed a wide geographic and demographic spread but with catchment areas which did not overlap.

	<b>Year opened</b>	<b>Size m<sup>2</sup></b>	<b>No. Exhibits</b>	<b>Other Facilities</b>	<b>Schools Audience</b>
<b>Thinktank</b>	2001	8,000	220-230	Fixed planetarium 3 classrooms Science laboratory Lecture theatre	West Midlands. Many large urban schools in areas of deprivation.
<b>Inspire</b>	1995	300	35-40	Workshop space	East Anglia. Predominantly rural schools.
<b>TQ@N</b>	2003	500	60-65	Science theatre Workshop space	North Wales & NW England. Many rural schools with very low rolls.

### 2.1 Details of consortium partners

<b>Consortium member</b>	<b>Total annual No. visitors</b>	<b>Total annual No. schools visitors</b>	<b>No. FTE staff</b>	<b>Annual Income</b>	<b>Total annual No. schools' outreach visitors</b>
<b>Thinktank</b>	280,000	53,595	64	£5,224,000	17,053
<b>Inspire</b>	33,400	15,000	3.5	£106,400	11,200
<b>TQ@N</b>	58,700	17,400	9	£117,000	6,300

## **3. Projecting Science: The Project**

### **3.1 Background to the project**

The consortium was formed through discussion between management staff who quickly recognised a common desire for new outreach activities and equipment which, if developed collaboratively would:

- Increase provision to schools who are underrepresented in the centres
- Provide shows which covered areas of the National Curriculum not currently covered by existing programmes
- Increase provision to schools in certain areas of the curriculum
- Increase the skills base of each centre during the project and beyond
- Provide staff development opportunities

In addition to the common desires, each centre had its particular need or expertise which, when shared would benefit the consortium as whole:

- Thinktank had expertise relating to planetarium equipment but little knowledge of taking this expertise to schools as outreach
- Inspire and TECHNIQUEST@NEWI had extensive experience of delivering a variety of outreach activities to school pupils of all ages but were in need of new equipment to replace old and worn optical planetaria.
- Thinktank had staff biologists where Inspire and TECHNIQUEST@NEWI did not
- Inspire and TECHNIQUEST@NEWI had expertise in developing activities on light and colour, and space for outreach.

All centres had existing schools outreach programmes: Inspire and TECHNIQUEST@NEWI had delivered planetarium shows to schools for some years for which uptake by teachers has been consistently high and feedback encouraging; Thinktank already delivered other shows and workshops in schools but wished to expand on the success of its on-site planetarium through outreach. The centres have excellent reputations for delivering high quality programmes, and had identified the need for extending outreach provision based on feedback from schools over several years.

### **3.2 Review of project objectives**

Original project objectives were:

- To create and deliver inspiring astronomy, physics and biology based outreach programmes to KS2 and KS3 schools who find it difficult to visit the consortium member centres
- To provide and advocate a unique learning environment using state-of-the-art, versatile, digital mobile dome technology
- To enhance overall sustainability of consortium member centres through an enhanced outreach service
- To develop pre and post visit materials and CPD opportunities that meet teachers' needs
- To provide CPD opportunities for consortium staff through collaborative activity
- To foster relationships in a spirit of dissemination of best practice between centres with varying needs, skills and experiences.

The consortium developed, trialled and delivered three different presentations: Astronomy for KS2, Light and Colour for KS2 and Cellular Biology for KS3. The shows were offered and delivered to schools which fulfilled one or more of the five criteria specified as the project's target audience.

Mobile inflatable domes and digital projection equipment were purchased for each consortium centre (3 total). Digital animation was commissioned and produced for the cellular biology show for the use of each consortium centre.

Each centre has incorporated the shows into their outreach programmes for schools and marketed to their entire catchment areas. The shows are now available to all schools served by the centres and will continue to feature as part of their outreach programmes in future years.

Pre and post visit materials were produced, taking the form of posters, to be given to schools and worksheets which are available for teachers to download from the centres' websites. Development and production of these materials to the standard required took longer than anticipated and this will result in materials being issued to schools after the delivery of the shows, rather than during the same visit. For this reason, the materials did not feature as part of the evaluation.

CPD for teachers was delivered as one-to-one contact sessions before and after shows, as presentation of services at launches and through the arrangement of a teacher CPD day in Wrexham in partnership with Careers Wales Powys (6 March 08).

The centres produced basic show content and outline scripts through collaborative working on writing away days from the centres. The shows were then developed further by centre staff, one show at each centre. During this stage of development, relationships between the centres continued to create a high quality, useable product for all. Technical training took place as one group and at each centre in smaller groups. Staff also made visits to each others' centres, to train for shows, help in delivery and as a general staff development exercise. Pre and post visit materials were developed collaboratively through email and through centre visits.

A collaborative approach was established at the start of the project and has been maintained throughout. The same project team has, as a direct result of this project, applied for and been awarded a grant to develop another secondary schools show using this equipment and development model.

### **3.3 Detailed project description**

The project, to:

- Provide new planetarium equipment and digital projection equipment for each of three centres.
- Devise in collaboration, three new planetarium shows (Key Stage 2 Astronomy, Key Stage 2 Light and Colour, Key Stage 2 Cellular Biology) which would be owned equally by the three centres
- Commission digital animation for the cellular biology show.
- Deliver these shows to seven schools in each centre's catchment area (21 in total)
- Devise, produce and deliver pre- and post-visit support materials for schools
- Evaluate the project as whole
- Create a relationship which could be continued beyond the project on similar initiatives.

#### **Administration, procurement and reporting**

The project began by recruiting a project coordinator to work for the duration of the project to gather information for the consortium, procure equipment, organise travel and accommodation and produce documents for reporting. The project team placed emphasis on a clear and concise project schedule at the start, taking into account all centres' staffing levels and commitments to other projects.

Three inflatable planetaria and digital dome projection system for each were procured before any development work could begin in earnest. An independent evaluator was also commissioned at this stage.

#### **Development**

Staff from all three centres who would be involved in show development attended writing days, where outline scripts and content with reference to the National Curriculum were developed in full collaboration.

At the end of these days, each centre team was allocated one show outline to develop into a full show back at their own centres. Digital animation for the cellular biology show was developed and commissioned as part of this process. Collaboration between centres continued throughout.

Development staff attended a further set of writing days to develop outlines for pre- and post-visit support materials. These materials took the form of worksheets, to be downloaded by teachers from centres' websites, and posters to be given to teachers following an outreach booking. At the end of these days, each centre team developed the materials relevant to their developed show.

TECHNIQUEST@NEWI was commissioned to design and produce posters and worksheet formats which would act as reinforcement of information from the shows and promote the project, the partners and the funders to schools.

#### **Staff Training**

Development and delivery staff from all three centres met at Thinktank to take part in a technical training day where shows were presented for feedback, and domes

and equipment were tested. Further staff development took place at each centre, and continues to do so.

### **Delivery to schools**

Schools who fulfilled the criteria identified as the target audience (see 3.6 below) were contacted directly to invite them to participate and shows were delivered in these schools during December 07 and January 08. Shows were evaluated informally by delivery staff and shows were adapted in response to lessons learned during delivery.

### **Evaluation**

The independent evaluator was involved in attending writing days, schools and centres to provide a full evaluation of the project.

### **3.4 Summary of project data**

	<b>Total no. participants</b>	<b>No. pupil participants</b>	<b>No. adult participants (est.)</b>	<b>No. participatory hours (est.)</b>	<b>Total No. schools</b>
<b>KS2</b>	1,308	1,210	78 teachers with pupils 20 teachers on CPD	660	17 (est. 14 new)
<b>KS3</b>	417	400	13 teachers with pupils 3 teachers on CPD 1 Polish translator	220	4 (none new)
<b>TOTAL</b>	<b>1,725</b>	<b>1610</b>	<b>115</b>	<b>880</b>	<b>21</b>

### **3.5 Numbers of new school and teachers reached**

The intention of the project was not to increase the number of schools worked with for the centres but to shift the emphasis from serving only the schools who are proactive in engaging with the centres to providing a special service to those who have more difficulty. The overall number of schools worked with therefore did not increase significantly. However, it is hoped that the project will encourage the participating schools to engage in the future, and so increase engagement overall.

Number of schools worked with before the project	Thinktank – approx. 600 schools p.a. TECHNIQUEST@NEWI – approx. 200 p.a. Inspire – approx. 150 schools p.a.
Number of schools/pupils worked with after the project	Not possible to quantify at this early stage (see note above).
What % of schools within your area have visited you	Centres have worked with 50-70% of schools in their catchment areas.

### **3.6 Hard to reach schools**

The project's target audience was schools who are underrepresented in the three science centres:

- Geographically isolated schools, making the coach trip too long for a school day
- Small schools and so transport costs are high
- Schools with pupils for whom the cost of a school trip is often beyond their means
- Schools where educational attainment at KS2 is significantly below the national average
- Schools in deprived areas.

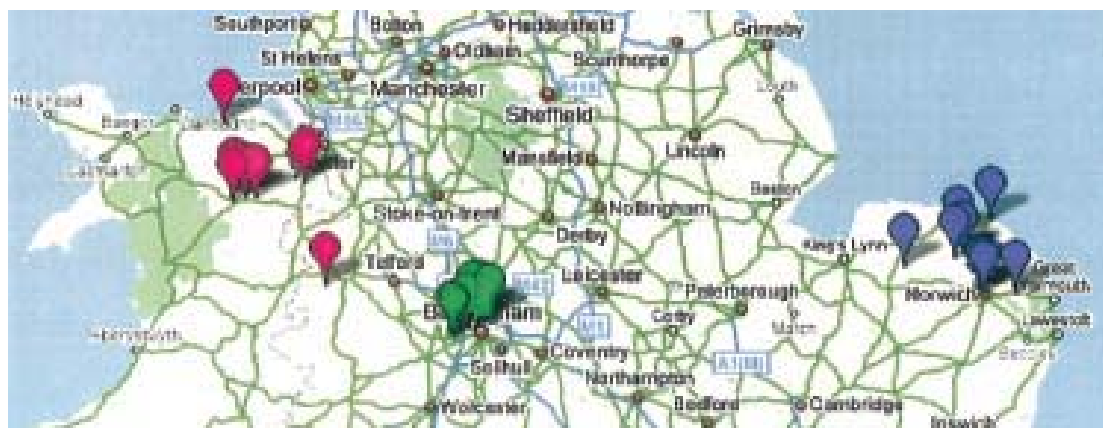
### **3.7 Charging schools for participating in the project**

Schools were not charged for shows delivered as part of the project – this charge was part of the funding received by the centres. The consortium's intention was to engage schools who do not attend and while reasons for this are various (specified above), the resulting difficulty for schools invariably comes down to cost. It is necessary for the three centres to charge schools for outreach services unless a project such as this one provides the funding.

### **3.8 Marketing approach**

All three centres carry detailed information regarding their catchment areas and the schools within them, including details of whether schools have visited the centres. Each centre used this information to identify non-visiting schools, in rural or deprived areas, and with low numbers (as appropriate for each centre). Schools were invited by telephone to participate. A free, curriculum linked activity which would come to the school was sufficient incentive for most schools to agree immediately.

### **3.9 Distribution of schools across the UK**



To view this map on the web with details of schools and participants, please go to:

<http://maps.google.co.uk/maps> and search **SCEAG and Projecting Science Outreach**

## **4. Impact of the Project on Partner Science Centres**

### **4.1 Collaborations and partnerships**

The three centres collaborate with a wide variety of other organisations to deliver, promote and enhance their programmes. These are different for each centre but include (and are not restricted to) SLCs, EBPs Careers Support organisations, schools, hospitals, FE and HEIs, STEMNET, local councils, science festivals and community groups. This project concentrated on the collaboration of the three centres, and the participating schools and did not involve other organisations, except insofar as the project's new shows have become part of the centres' school programmes.

### **4.2 Driving Innovation and sharing Best Practise**

Science centres, as generally relatively poorly funded educational support organisations, hold very small budgets for staff development, dissemination and programme development. This project has provided funding to address all of these areas in depth and to the benefit of a large number of staff. In addition, the programmes developed have significantly enhanced schools outreach programmes in a cost-effective way - collaborative development has resulted in all centres receiving three new shows in the time they would normally have managed to create one.

The opportunities afforded to the centres for skills sharing and dissemination to a wider audience have been of huge benefit to individuals and to centres. The project has given a platform to share experiences and skills, where a willingness to do so already existed, but no funding to implement.

### **4.3 Contribution to financial sustainability of consortium members**

For the duration of the project, the contribution to financial sustainability was income for:

- programme development (staff salaries, travel and subsistence, props, equipment)
- delivery of shows to schools who would not have otherwise provided it
- the sharing of lessons learned with other practitioners

Beyond the project, the programmes created will provide income as follows:

- school bookings (consortium centres have already detected an increase in schools bookings from February onwards)
- there is potential for sales of shows to other centres (see 5.1 below) and this will be explored during post project review

The contribution the project has made to skills and professional relationship development of consortium staff will continue to bear fruit for future projects (see 5.1 below).

The income provided to each centre represents, as a percentage of total income approximately 2% for Thinktank, 17% for TECHNIQUEST@NEWI and 14% for Inspire. For the smaller centres this amount has significant value. Without this level of funding, no new programme development is possible (new programmes are vital to science centres, in order to meet the changing needs of teachers in their delivery of the National Curriculum).

### **4.4 Press activity**

See Appendix 3 for press coverage.

## **5. Opportunities and Plans for the Future**

### **5.1 Follow on Actions**

The consortium has already secured further funding through the STFC grant scheme of approximately £21,000 for a similar project using the same collaboration model and the equipment purchased.

The consortium used part of its funding to purchase the licence for the digital animation commissioned for use in the cellular biology show in order to open opportunities to creating revenue from show sales. This will be explored during post project review.

### **5.2 Handover Plan**

The project was designed with no need for handover – participating staff will continue to deliver the shows and to train other centre staff without the need for input from the consortium.



The equipment purchased has a life of approximately ten years, and spares were purchased for less durable items.

All consortium members have affiliations with professional support organisations, such as Ecsite-UK, the British Interactive Group and Group for Education in Museums. Staff will continue to share skills and experiences through them.

### **5.3 Post Project Review Plan**

The consortium's post-project review is influenced by the beginning of its next funded collaboration through STFC and so its management group will meet during April 08. This meeting will include a self-evaluation exercise, review of the evaluation report and feedback following the project end and recommendations for the next project (beginning immediately).

## **6. Recommendations (Lessons learned)**

### **6.1 Recommendations relating to the collaboration**

1. Each consortium member should be clear and up-front about what they can and can't achieve
2. Each consortium member should state clearly if any of their circumstances have changed/they are having difficulties
3. A collaborative project takes longer to execute than a unilateral one – allow for this in scheduling
4. Ensure that each partner's contribution is recognised – one partner should not overshadow others
5. The budget should be set out clearly and agreed from the outset
6. Consortium members should meet or converse as often as possible
7. involve delivery staff in development, not just management.

### **6.2 Recommendations relating to project deliverables**

1. The consortium should set out clearly and simply what the objectives are, and remind itself of these regularly.
2. Do not set too many objectives – the intention should be to do a few things well, not many things adequately (or badly)

### **6.3 Assessment of project planning, delivery and other techniques used**

The consortium established its project schedule in some detail during the application process, taking into consideration the three centres' commitments to other work and placing an emphasis on achievable outcome for all concerned.

Through its principal applicant (Thinktank), the consortium recruited a project coordinator to act as an administrator, gathering information for reports, procuring the bulk of equipment and arranging travel and accommodation. This facility was extremely valuable to the project as a whole.

Outline scripts and support materials were developed at writing 'away days'. This was essential to the success of the project as it removed participating staff from

the distractions of work at the centres, allowing time for creative development. The writing days also set a tone of collaboration which was then continued throughout.

## **6.4 Analysis of Project Issues**

### **Budget**

The budget was well laid out in the application and there was little variation from the original plan and on the whole, the consortium is pleased with its budget planning. Any variation related to a need to spend somewhat more of the budget on development time (see time, below) and this cost corresponded to a saving made in other areas.

### **Cashflow**

The consortium had to make some adjustments to the project because of the large up-front cost of equipment necessary in order to begin development. Equipment costs could not be covered until after the second grant claim and so this issue had the potential to cause cashflow problems. The situation was managed through an agreement between the partners to delay invoicing the project for other costs (such as staff time, travel and subsistence) until funds for the bulk of the equipment had been received. Funding related to equipment took the majority of the first two stage payments and resulted in the centres carrying other costs until the project's end. Without the advanced payment on Claim 2, the project would have been seriously impeded.

### **Time**

The consortium, having not worked as a collaboration before, underestimated the extra development time required to work with other consortium members. Management of the staff time caused no major difficulties for the centres but this would not have been possible without the flexibility to transfer some of the budget to cover the staff costs.

### **Schedule**

The project was completed within the overall schedule set out at the start, though there were a number of aspects of the project which caused the schedule to shift from the original plan:

- Development of shows was reliant on receiving dome, projection and digital animation up front and the bulk of the budget went on this equipment. In addition, much of the equipment was being delivered from Australia. These issues meant that development could not begin in earnest until payments were made and equipment received. Delivery in schools was subsequently rescheduled from Sep - Dec 07 to Nov - Dec 07.
- The consortium experienced some difficulties in recruiting schools to the project to receive shows to fit in with the revised schedule: schools are busy during November and December in the run-up to Christmas and so were not inclined to commit to extra activities. This made it necessary to continue delivery into Jan and early Feb 08.
- TECHNIQUEST@NEWI experienced staffing problems from Oct 07 - Mar 08 as a result of sickness and then loss of senior management staff. As a small centre

with few staff, this loss related to a large proportion of the staff time dedicated to the project. Support from other consortium members was extremely valuable at this time and much of the work was shared in order to complete the project successfully.

### **Reporting and Administration**

The recruitment of a project coordinator was valuable to the project as a whole and provided support in procurement, arrangement of travel and accommodation and reporting to funders. However, this resource could have been better used to benefit all three centres in organising the booking schedule for delivery to schools. This booking process did create some strain for Inspire and TECHNIQUEST@NEWI, where no additional admin support was arranged. The project coordinator's role could have been expanded in order to better support all three centres, through central booking with schools and arrangement of evaluation sessions.

### **Staff Training**

A sufficient degree of staff training took place through the project but was difficult to schedule due to the number of staff required at one time, and the impact this had on each centre's other booking commitments.

## **7. Evaluation Report**

Please see Appendix 4 for full report.

*"I liked it coz it's different to nearly everything else I've seen about science... .. in the dome with it all around you, you automatically felt like you are there, it's happening to you and you're learning all the time. And it kept us more focussed, more interested."* (Student, Cell biology show)

### **Introduction**

Projecting Science is a collaboration between Thinktank Birmingham Science Museum, Techniquet@NEWI, and Inspire Discovery Centre. It developed three new interactive shows that utilised inflatable domes and 360° projection technology. The project aimed to create and deliver inspiring astronomy, physics and biology-based outreach programmes to KS2 and KS3 schools who find it difficult to visit the consortium member centres.

### **The Evaluation**

The evaluation used before-and-after questionnaires (n=318) and focus groups (n=36) to explore students' experiences and project outcomes. The opinions of teachers (n=15) and project partners (n=7) were also included.

### **Findings: Experiences**

- A large majority of students agreed that they **liked the shows** (97%, 93% and 86% for Astronomy show, Light and colour show and Cell biology show respectively);

- Most students also agreed that the show was a **fun way to do science** (92%, 82% and 86% for Astronomy show, Light and colour show and Cell biology show respectively).

Most students described the shows as useful, fun, cool, clever and exciting. Very few students described the level of the shows as either 'too easy' or 'too hard', which indicates that the science was pitched at an appropriate level for the audiences.

Teachers felt that the novel nature of the learning environment made for a fun and engaging experience for students.

*"Everything different and visual seems to bring science alive for the children"* (Teacher, Light and colour show)

### Findings: Attitudes

- Over half of students, and more in the case of the Astronomy show, agreed that the show **made them like science more** (73%, 57% and 56% for Astronomy show, Light and colour show and Cell biology show respectively).

A significantly lower proportion of students agreed that '*we have to do too much work in science*' after participating in the Astronomy show and Light and colour shows. On a similar note, students that participated in the Cell biology show were significantly more likely to reject the notion that '*we do too much science at school*' after they took part.

*"It changed how I feel about science because I never knew you could have fun as well as learn that much in one lesson"* (Student, Astronomy show)

### Findings: Learning

- Most students agreed that the shows **helped them with their science** (78%, 68% and 81% for Astronomy show, Light and colour show and Cell biology show respectively);
- Over four-fifths of students agreed that they **learned lots from the show** (94%, 82% and 90% for Astronomy show, Light and colour show and Cell biology show respectively).

Students appear to have significantly improved their knowledge on one of the items tested for each show. The improvement was most marked in the final Cell biology show question where students were able to write the answer in their own words. These results indicate the educational value of the show when measured against quite narrow indicators; students were also encouraged to write down what they had learned later in the questionnaire. However, some misconceptions were also uncovered by the questions and supported by teacher feedback.

*"Yes - we are doing a unit on Earth, Sun and Moon and it was reinforcing some of the work we had covered - in a much more 3D way than is possible with our own resources"* (Teacher, Astronomy show)

## Conclusions

The dome shows successfully addressed four of the five Generic Learning Objectives. Students enjoyed the dome activities, and significant learning and positive attitudinal shifts were measured using the questionnaires. The evaluation data noted some areas where the shows could be improved, however the evidence indicates that **the dome shows were an enjoyable way to support and enrich the curriculum.**

The project undoubtedly **enhanced the outreach service** of the three centres. All centres are now delivering the three shows as part of their outreach offerings. They also felt that the equipment would allow them to develop shows for a wider range of audiences, so diversifying their outreach and contributing to sustainability.

Development of the **pre- and post-visit materials** was not completed during the funding period, although they will be rolled out with the shows in future. The consortium member leading on this aspect left the centre suddenly which severely slowed development of the materials.

Consortium members felt that the **partnership was effective and beneficial.** They are planning to work together again in the near future having successfully bid for funding from STFC to develop a new dome show based on the atom.

**Appendix 1: Project Budget**

## Appendix 2: Project Schedule

Item	% complete	reasons	Actions	
1	Procure new planetarium equipment and digital projection equipment.	100%		
2	Collaboratively devise outline shows through writing days.	100%		
3	Commission digital animation for cellular biology show.	100%		
4	Develop shows.	100%		
5	Collaboratively devise outline pre- and post-visit support materials through writing days.	100%		
6	Design and print pre- and post-visit support materials.	90%	<i>(extra time required to revise content &amp; designs)</i>	Design complete, Sign-off and print required. TBC by 7 Mar 08.
7	Deliver 21 no. shows (7 by each centre).	100%		
8	Deliver support materials to schools	0%	<i>see 6</i>	Pre-visit materials uploaded to websites, posters delivered to schools. TBC by end Mar 08.
9	Project evaluation	100%		
10	Post project review	0%	<i>project end, Mar 08</i>	TBC April 08.

## **Appendix 3: Press Coverage**



## Joining Forces In-reach Project

Bridget Holligan, Science Oxford

29 February 2008



### **This project involved the following centres:**

- Hands On at Science Oxford, Oxford
- INTECH, Winchester
- Techniquet, Cardiff

### **1. Summary of the project**

Science Oxford (SO), INTECH (I) and Techniquet (TQ) developed a model for a project to help pupils and teachers with the transition from primary to secondary school. This was achieved by using the combined expertise of the partnership to develop a linked experience for pupils and teachers, which could continue to be used by all centres beyond the end of the project. An interactive science show exploring the theme of forces was developed and presented to 2306 Year 6 pupils from 65 primary schools in the summer term. A second forces show was developed and performed to 2465 (mostly the same) pupils, now in Year 7, in the autumn term. Pre- and post- visit materials for both stages were developed for teachers to use in school, and initial teacher CPD sessions in each centre (54 teachers in total) were used to introduce the programme and resources to schools.

### **2. Background of the consortium**

SO is a cultural centre for science, run by The Oxford Trust. The Oxford Trust is a charitable trust which has been working for over 20 years to encourage the study, application and communication of science and technology. SO includes the small interactive science centre, Hands On (35 exhibits), along with an information centre, event and exhibition space.

I is a medium sized (100 exhibits) interactive science centre, which also has a 176 seater planetarium/auditorium and runs its own exhibit fabrication workshop. I is administered by the independent educational charity The Hampshire Technology Centre Trust Ltd. (HTCT), which was established in 1986. HTCT has the specific purpose of promoting the knowledge and understanding of science, technology, engineering and mathematics.

TQ is a large interactive science centre (150 exhibits), which first opened in 1986. TQ also has a science theatre, laboratory and planetarium and operates its own workshop where it designs and builds nearly all its own exhibits. TQ is a registered charity and company limited by guarantee and is part-funded by the Welsh Assembly Government.

TQ initiated the partnership and, in light of the grant conditions for larger and smaller centres to work together, contacted two smaller centres in other geographical locations with whom it felt it could work effectively on an in-reach transition project. SO were asked to be the Principal Applicants for the bid.

All centres were able to bring expertise in partnership working, show presenting and educational resource development to the consortium. All centres have good contacts with their local primary and secondary schools and have established reputations for quality provision. TQ and I, as larger centres, also have exhibit design and build workshops.

### Details of consortium partners

Consortium member	Total annual visitor numbers	Total annual school visitor numbers	Total annual school outreach numbers	Number of FTE staff	Annual Income
Science Oxford	9376	2550	15,000	13.5	£965,143
INTECH	76,000	17,000	1,300	20	£1,537,276*
Techniquet	179,431	47,221	42,536	74	£3,000,000

\*includes grant for installation of digital planetarium

## 3. Joining Forces: The Project

### 3.1 The background to the project

All centres in this partnership were keen to run an in-reach project together that brought more school visitors into their centre. All in-reach projects for the SCEAG grant scheme needed to target pupils during the Y6/Y7 transition phase. The project conceived allowed the centres involved to build on their strengths and to develop resources on a theme which has strong curriculum links, and for which they were confident there would be continued demand for from schools.

TQ develops all its own exhibits and demonstration kit and has developed 60 shows and work for Early Years – post-16 since 1992. I designs and develops its own exhibits and has been developing and delivering in-reach workshops since 1996. SO has been developing and delivering shows and workshops in schools since 1988 and as part of Hands On visits since 2005. SO and TQ have worked together before on joint activities supported by Ecsite-UK and the British Interactive Group (BIG). SO and I both hold contracts to be SETPOINT organisations, and as such work together on primary school outreach projects such as Discovery South East.

### 3.2 Review of project objectives

The project has performed well against its original objectives. Interactive science shows for KS2 and KS3 pupils were developed and these were performed to 2306

Year 6 and 2465 Year 7 pupils (exceeding original collective pupil target numbers of 2250). Corresponding pre- and post- visit resources for each stage were also developed successfully. The recruitment of schools to the programme in the short time frame available was not an easy task, as the schools had to be recruited in clusters and not individually and in-reach delivery had to begin in mid-June. The target was for each centre to recruit 5 secondary schools and their 25 (approx) cluster primary schools. SO exceeded this target, with 6 secondary schools and 29 primary schools. I recruited 4 secondary schools and 10 primary schools and TQ recruited 5 secondary schools and 24 primary schools.

All centres developed ran an associated CPD course for teachers at the start of the project. However the tight timescales gave very little flexibility with dates and as a consequence no centre was able to have teacher present from all participating schools at their CPD session. The CPD at SO attracted 23 teachers, representing 15 primary schools (of 29 recruited) and 2 secondary schools (of 6 recruited). The CPD at TQ attracted 21 teachers, representing 19 primary schools (of 24 recruited) and 2 secondary schools (of 5 recruited). The CPD at I attracted 10 teachers, representing 8 primary schools (of 10 recruited) and 2 secondary schools (of 4 recruited). As a consequence not all schools were fully aware of the transition nature of the whole programme and not all schools made full use of the in-school resources. In particular, there was very little time available between the CPD sessions and the first delivery phase, for the Y6 teachers to use the pre-visit KS2 resources developed.

The project was evaluated by TQ. The method of evaluation was pre and post pupil questionnaires, before and after each of the *Joining Forces* shows as well as formative, post and delayed-post questionnaires for the teachers involved in the project. Generic Learning Outcomes (developed by The Research Centre for Museums and Galleries, Leicester University) were used in order to structure the evaluation.

The project did offer staff in each centre the opportunity to learn from each other and did encourage closer working between the centres and their local teachers. The project also promoted visits to the centres at a time of year which is traditionally quiet.

### **3.3 Detailed project description**

#### Research and Development – Shows and Visit Structure

Two interactive science shows about forces (KS2 and KS3) were developed for this project, along with associated pre- and post- visit resources for both stages. Show development was initiated in February, with a 'Show Sharing' day at TQ to stimulate content development for the KS2/3 shows, based on existing expertise and experience from the three centres. However, the eventual TQ show developer was not present at this meeting. TQ began development of the KS2 show in March, with particular work on research and content. There was liaison between all centres regarding space and facilities that each has for show provision, so that this informed the design and fabrication of show props for demonstrations. A detailed draft outline of the KS2 show was discussed at a consortium meeting in May and TQ completed the KS2 show and props for a presenter training day in June. Individual centres completed the final development of the KS2 show to fit with their presenters.



*" An absolutely super day – wonderful that it will continue onto secondary school, children are already looking forward to it." KS2 Teacher, Cheriton Primary, Hants*

TQ issued the first draft of the KS3 show script in July. There was some discussion of the content but other centres were allowed relatively little input to this show. The KS3 show was completed in August, with another presenter training day, and all centres were asked to stick to the format provided due to TQ concerns about impact on the evaluation.

SO begin work in July on how to distinguish the Year 7 visit from the Year 6 one, and how to strengthen the 'transition' element of the project through the format of the visit. It was decided that, in addition to the KS3 show, pupils would work in small groups to explore a forces-linked exhibit. They would be given a short worksheet of questions to answer and would have to prepare a short presentation (1-2 minutes) about their exhibit and the forces it uses. A selection of generic 'props' (card, scissors, balloons, film canisters etc) would be provided to give them the option of creating their own demonstration or model as part of the task. Pupils would be asked to imagine that they are talking to a group of Year 6 pupils (themselves a year ago).



#### Research and Development – Pre-/Post-Visit Resources

Science Oxford began development work on pre/post KS2 resources in April. They consulted with the Oxfordshire Primary Science Advisor on the proposed content of the resources and ran a session with local teachers in May to trial some of the activities. The KS2 resources were completed in June and distributed to the other centres. I began development of KS3 pre/post visit resources in June and distributed them to the other centres in August.

### School Recruitment

I and SO begin raising awareness of the project with secondary schools in their area in March. Primary school participation in the project was to follow on from secondary school recruitment, as generally 5/6 primary schools are clustered to each secondary. Early feedback in Oxfordshire indicated that the partnership element of school involvement would make it more time consuming for centres to recruit schools and that individual contact would have to be made with both target secondaries AND their feeder primaries. All centres worked on school recruitment in April and had completed their KS2 visit bookings by the end of May.

*"This is a very worthwhile project, I think it would be interesting for the KS3 teachers to observe a KS2 visit and vice versa." KS3 Teacher, Oxon*

### Teacher CPD

The format for the CPD sessions was devised in May and all centres completed their CPD sessions in June. These sessions allowed the primary and secondary teachers to meet each other, allowed each centre to describe the format and objectives of the project and to explain the evaluation processes, and allowed for some group work on forces in the curriculum – sharing ideas, sampling the KS2 pre-/post-visit resources and discussing the progression from KS2 to KS3. SO had 23 teachers (17 schools) attend, TQ had 21 teachers (21 schools) attend and I have 10 teachers (10 schools) attend. The SE Science Learning Centre was able to assist with the delivery of the CPD session at I. TQ carried out some evaluation at their CPD session to input into the evaluation report for the project.



### Delivery

All centres agreed in April to move original deadlines forward by 3 weeks in order to allow SO to begin KS2 show delivery in mid-June, as the size of Hands On would not allow them to process the required number of school visits otherwise. All centres completed their Year 6 visits in July - 29 schools visited SO (31 shows for 968 pupils), 12 schools visited I (503 pupils) and 24 schools visited TQ (835 pupils). During each visit pupils watched the 'Joining Forces' show and spent time exploring the interactive exhibits in each centre.

*"Pupils gained a lot from the experience and consolidated their understanding of a difficult aspect of science." KS2 Teacher, Tredegarville Primary, South Wales*

TQ completed all their KS3 visits in September, delivering 11 shows to a total of 880 pupils. I complete all their KS3 visits in October, delivering 4 shows to a total of 713 pupils. SO complete all their KS3 visits from September–December, delivering 20 shows to a total of 872 pupils. The conversion of the Intech auditorium into a planetarium restricted the time available in which to present the KS3 shows. One school was unable to attend with the available dates, which meant that one KS3 show had to be presented as outreach. Visit plans for two SO schools were impeded by the loss of all key contacts in those schools during the summer holidays. These schools were eventually brought back on board, but shows needed to be performed as outreach.

*"Very useful at KS3, it brought 'forces' to life. It challenged practical and thinking skills at all levels of ability." KS3 Teacher, Oxon*



### Evaluation

TQ completed the evaluation strategy for the project in May and produced pre/post visit evaluation questionnaires for pupils, focusing on learning outcomes. Pupil questionnaires were given to the other centres in June for distribution to schools at CPD sessions (or posted to named contacts). TQ issued post-visit teacher evaluation questionnaires in July. TQ begin analysis of KS2/3 questionnaire data in November and December and also began the process of carrying out delayed post-questionnaires with KS3 teachers. Individual centres sent these out to their contacts in the first instance, with TQ following up as required, using contact information provided by centres. The collection of all pre-/post- evaluation data was completed in January and TQ completed the analysis of the data in February, providing a summary of this to other centres at the final consortium meeting.

*"...a number of children have been back already to their primary school to report on how much they got out of their second (forces) visit." KS3 Teacher, Oxon*

In addition to the evaluation work on learning outcomes, TQ circulated a 'project review template' to all consortium partners in October. This was completed by all centres, allowing them to give their feedback on the partnership and the project. A combined version of this template accompanies the evaluation report.



### Meetings

Consortium meetings were held in February 2007 (TQ) , May (SO), July (I), November(I) and February 2008 (SO). In addition, there was a 'show sharing' day in February (TQ) and two presenter training days in June and August (TQ).

Consortium partners participated in a dissemination event about the SCEAG Grant Scheme projects at the British Interactive Group (BIG) annual conference in July and staff from all centres attended the SCEAG meeting at the BA Festival in September.

### **Summary of project data**

	Total number of participants	Number of student participants	Number of adult participants	Number of participatory hours	Total number of schools
KS2	2549	2306	243	5098	65
KS3	2620	2465	155	5240	15
TOTAL	2969*	2571*	398	10,338	80

\*have assumed 2200 of the KS2 pupils were the same pupils reached in KS3

### Numbers of new schools and teachers reached

<b>Science Oxford</b>	<b>Numbers</b>
Number of schools worked with before the project	Every year SO typically works with about 70 maintained secondary schools (87% of region), 175 maintained primary schools (34% of region) and 40 independent schools (31% of region). Our region is Milton Keynes, Oxfordshire and Buckinghamshire (defined by our SETPOINT role).
Number of schools worked with after the project	All of the participating 6 secondary schools had worked with us in the previous year on other projects, with 5 of the 6 making a visit to SO for another event. Nine of the 29 participating primary schools had not worked with us at any time in the previous 2 years and 22 of them had not visited Hands On during the previous 2 years. Five of the



	new primary schools have already chosen to work with us again.
What % of schools within your area have visited you	Most of our work with schools is done on an outreach basis. We primarily promote SO/Hands On as a visit location to Oxfordshire schools only. 56% of Oxfordshire maintained secondary schools have visited Science Oxford in the last year. 25% of Oxfordshire maintained primary schools have visited Hands On at SO in the last year (usually this figure is more like 16%, so Joining Forces had a big impact for us here).

<b>INTECH</b>	<b>Numbers</b>
Number of schools worked with before the project	400 schools visit I each year. Outreach has visited 60 schools during the current financial year. 2300 schools are within a 1 hour travelling time from I (defines region). As SETPOINT link with many more schools for e.g. BA CREST and science fairs.
Number of schools worked with after the project	Three of the 16 schools I worked with on the project had not visited before and another 2 had not visited for several years.
What % of schools within your area have visited you	See above, about 17%

No information for this section has been provided by TQ.

#### Definition of hard to reach schools

For SO and I this was primarily defined as schools who had not visited them before. Science Oxford ensured that one of their secondary/primary school clusters was from Oxford City's key area of deprivation, and that the schools involved in the project were spread geographically around Oxfordshire, ensuring a good mix of urban/metropolitan and rural schools. For TQ, four of the five targeted schools came from areas of multiple deprivation.

#### Charging for projects

None of the schools participating in the project were charged, and the grant also allowed the centres to cover their travel expenses. The primary rationale for not charging was to overcome what is usually the most significant barrier to participation, especially with in-reach projects where schools have to travel. Not charging also means that the schools involved are more cooperative with additional elements, such as attending an initial CPD session and participating with the evaluation processes.

All centres will charge in the future, in line with their normal charging policies, although all centres are planning on making the pre-/post- visit resources available free of charge (via websites). SO typically charges about £3 per pupil for a Hands On visit, which includes a show such as 'Joining Forces'. For outreach purposes, SO



charges £100 for a single show, £160 for two shows or £210 for three shows. I typically charges £3 per pupil for a visit, with additional shows (such as 'Joining Forces') costing an extra £1.50 per pupil or workshops from £1.

No charging information provided by TQ.

#### Marketing approach

The approach taken here was very targeted, as there was such a short lead in time for the project. SO talked about the project at the Oxfordshire Secondary Heads of Science conference and handed out a summary sheet, which described what was involved and when, emphasised that participation was free and included cover for travel expenses, and who to contact. In addition specific e-mails were sent to certain schools with well established named contacts (either the Head Teacher, the Head of Science or the Head of Science Specialism). I invited 4 specific secondary schools to participate – 3 were invited personally at a local curriculum support group and the fourth by letter. TQ contacted all their schools by telephone and found that the big 'selling point' was the free transportation – the first school recruited was one with an established contact. For all centres the secondary schools were recruited first, before following up with their cluster primaries. SO followed up with the primary schools by phone and fax, TQ by phone and I by letter. SO and TQ got a good corresponding response from the primary schools, but I found that only 12 of the 25 primary schools agreed to participate. Of the primary schools that did not attend (for I), the busy schedule at the end of term was cited as a reason.

#### **Picture of the projects across the nation**

SO – schools were spread around South, West and North Oxfordshire, including a cluster based in Oxford City. Could provide postcodes to help with creation of a map.

I – all the schools involved were from the Winchester area.

TQ – has provided a map with each of the secondary schools marked on it, currently held by SO.

### **4. Impact of the Project on Partner Science Centres**

#### **4.1 Collaborations and partnerships**

SO worked with the Oxfordshire Primary Science Consultant and local teachers to prepare the KS2 pre-/post-visit resources. The Science Learning Centre SE assisted I with their CPD session for teachers. SO is the host organisation for SETPOINT MKOB and I is the host organisation for SETPOINT Hampshire and IOW. All these links existed before the project.

#### **4.2 Driving innovation and sharing best practise**

Most science centres are used to working closely with schools and developing educational resources and interactive science shows. This project was innovative because it enabled three centres to work together to pool their expertise and allowed them to explore if a linked experience (interactive science show and associated in-school activities) could be successfully provided by science centres to assist with the transition process from primary to secondary school, and whether it had any impact on pupils' learning. All centres are now left with a resource that they can continue to use and share with other science centres.

### **4.3 Contribution to financial sustainability of consortium members**

#### Science Oxford

Joining Forces had a big impact on the number of school visits to Hands On. In Hands On's previous incarnation, Curiosity (1990-2005), it typically got about 40-50 schools to visit each year. In 2005 Curiosity shut for 6 months for the move to Science Oxford, opening under a new name, Hands On. Following the move school visits dropped dramatically. In 2005-06 Hands On had 25 school visits and in 2006-07 Hands On had 65 school visits, 35 of which were due to Joining Forces. This means that during 2006-07 Joining Forces increase Hands On's school visits by 117%. Over the last 5 years Curiosity/Hands On has averaged 41 school visits per year, and even on that basis Joining Forces increased school visits by 63%. Some of the schools involved in the programme have already booked subsequent visits to Hands On (paid for), a good indication that this project will contribute to our longer term sustainability (at least in terms of Hands On visits).

SO has added both Joining Forces shows to in-reach and out-reach repertoires and below is a summary of additional paid activity generated (so far) as a result. These numbers will continue to grow, although it is hard to predict whether longer term this will significant affect overall uptake and income.

- 8 primary school bookings for the Joining Forces KS2 show as part of a Hands On visit
- 3 secondary school bookings for the Joining Forces KS3 show (outreach) for Y7 groups
- 3 secondary schools have also booked SO to deliver Joining Forces as part of their own transition projects. In one school this has involved delivering a merged KS2/3 show to a mixed Y6/7 group. In two others SO are delivering the KS2 show to their combined feeder primaries (10 schools) in June 2008 and then the KS3 show at each of the 2 secondaries in September 2008.
- The Oxfordshire County Science Team has booked SO to deliver a Joining Forces show to 120 KS3 pupils from 20 local schools as part of their annual County Science Day

5 of the primary schools involved in the Joining Forces programme have worked with SO again already, as a direct consequence of the fresh contact that the programme initiated. Two of these 5 have booked a Hands On Visit with Joining Forces show again, while the others have chosen something else from the repertoire.

In addition to the above SO has also been booked to deliver 2 KS2 Joining Forces Shows at Richmond Theatre on 7 March, for up to 1200 Y6 pupils as part of National Science Week. SO have also performed Joining Forces shows to families visiting Hands On (150 people). All of these audiences are paying for the experience.

#### Intech

- I now has the script and props for a fully evaluated science show and a set of pre and post visit resources that can be used in conjunction with the science show or by schools visiting the exhibition and using existing curriculum Forces trails and workshops.
- The show will be added to the portfolio of activities and presented, both as inreach and outreach. It will widen the choice of activities but not significantly change the overall uptake and subsequent income of the centre.

- I staff have gained experience, working with other science centres, sharing best practice etc.
- I do not expect a significant increase in revenue from this activity.
- The funding enabled I staff to meet with other science centre staff to share good practice

No additional information received for TQ for this section, apart from predicting that the 'new theme to the programme means that we will be able to attract 2000 pupils to the centre each year'.

#### **4.4 Press activity**

SO and TQ did not choose to use the project to generate any media coverage. I did invite local press to attend a show, but they declined the invitation. A press report was sent to a local paper, but was not published.

#### **4.5 Other benefits**

- Developing good working relationships with staff in other centres, which increases the chances of us working successfully together again and thinking of each other when opportunities arise.
- The project has enabled SO, as a smaller centre, to demonstrate that they have the skills and capacity to be an equal partner in this kind of project. We can deliver to just as many pupils, and we have valuable expertise to share. The requirement of the scheme that different sized centres should be involved has been fundamental to us, as otherwise it is hard for centres of our size to ensure we are included.

### **5. Opportunities and plans for the future**

#### **5.1 Follow on actions**

All centres have added the shows and resources to their portfolios, for further use as part of inreach and outreach repertoires (paid for by schools). The props created for the shows are being added to each centre's equipment library and used for future shows and other activities. SO have also been able to use some of the Joining Forces props in other contexts too, as a way of enhancing the interactive content of other presentations (thereby increasing their effectiveness). For example, SO have been running enterprise workshop sessions with an Oxfordshire company called Norbar Torque Tools and use the 'Giant Lever' prop as part of this.

I have created a science show combining the 'best bits' of the KS2 and KS3 Joining Forces shows. Both I and SO are continuing to offer the Joining Forces template as a transition activity for secondary schools to use with their feeder primaries.

All centres involved in Joining Forces would be interested in working with each other again should future joint funding opportunities arise.

#### **Handover Plan**

All centres have worked with the relevant internal staff to ensure that the shows developed can continue to be offered to schools. Both I and TQ have specialist workshops on site so can continue to maintain and replace the show props. SO does not have this facility but feels that most of the built equipment is of a quality that will last, with other less-robust elements being fairly easy to replace when necessary.

The pre-/post- visit resources, show scripts and prop ideas can be easily shared with other centres, although they would need to be able to build or commission their own props.

Discussion is underway for whether a BIG or Ecsite-UK session could be run to enable other centres to access the resource developed. SO is planning a session at BIG about the range and value of different presenting show styles, using Joining Forces as an illustration of where the same material was presented by different people in different places.

### **Post Project Review Plan**

All centres have already completed a 'Project Review Form' (Appendix 3) , designed by TQ, giving their feedback on the following areas:

- project performance
- adherence to schedule
- adherence to budget
- client expectation
- project impact
- project structure
- project communication
- project strengths
- project weaknesses
- lessons learnt
- recommendations

## **6. Recommendations (lessons learned)**

### **6.1 Recommendations relating to the collaboration**

1. A longer lead in time prior to the start of delivery (and bid submission) to ensure that a truly collaborative process can be set up, including discussion between partners about the evaluation strategy.
2. To ensure that when scripting shows/materials, that all centres are working together to produce them. This will enable greater consensus and restrict the need for approval via e-mail.
3. More frequent meetings and workshop sessions to assist with points 1 and 2. Important to ensure that show presenters, prop developers etc are able to meet and share expertise as well as project and senior managers.

### **6.2 Recommendations relating to the delivery**

1. An in-reach transition project ideally needs a longer lead-in time to recruit secondary schools (and subsequently primary schools) and make them more integral to the development and delivery of the project.
2. Effective transition projects need more direct collaboration with participating secondary schools. Schools should ideally be involved in bid submission as well as in development work and ideally should be more pro-active in working directly with their own cluster primary schools.
3. Being able to offer a project free of charge, with support for travel expenses, makes a big difference to school recruitment, since cost is the biggest single barrier.
4. To be able to run the project earlier in the summer term would have resulted in a greater uptake from primary schools.

5. That all centres, once agreed on a format, stick to agreed delivery times and evaluation methods.
6. Ensure that teachers from all participating schools can attend the CPD session.

### **6.3 Assessment of project planning, delivery and other techniques used**

In order to deliver the project on time and according to the right time scale, tasks were split between centres. This ensured that overall the consortium did deliver what it said it would, in the correct time frame and to budget. However this way of working was detrimental to the collaborative ethos. The short lead-in time before delivery restricted the programme's effectiveness as a transition project.

### **6.4 Analysis of project issues**

- Over-reliance on e-mail communication between partners made it difficult to gain consensus – this was due to insufficient collaboration, as already discussed.
- Tight deadlines to manage school bookings hindered recruitment and I was unable to meet its delivery targets – this situation was imposed on us by funders, although SO and TQ were able to meet delivery targets, so their processes may have been more effective.
- Not all participating schools were present at the original CPD sessions which meant the transition element of the project was lost - this low attendance was primarily a consequence of short time-scales.
- Loss of key contacts in schools over summer holidays affected KS3 take-up – a better plan needed to be in place in order to cope with this likelihood occurring.
- Teachers were critical of the content of evaluation forms, feeling that some questions were poorly worded and ambiguous – this was a consequence of not having enough formative input from teachers and insufficient discussion of the evaluation strategy and questionnaires between partners beforehand.
- Delay between submitting claim and receipt of money.
- Percentages of claims to Ecsite-UK were a problem, as there was a delay before centres could recoup all the money they had spent.
- The reporting structure and timetabling should be agreed at the beginning of the project.

## **7. Evaluation Report**

A separate evaluation report is provided looking at the impact of the project on the audience and with reference to Generic Learning Outcomes. The executive summary is given below:

The *Joining Forces* project aimed at improving the confidence and academic achievement of children making the transition from primary to secondary school in one of their key topics, forces. This is in response to a decline both in confidence and academic achievement (relating to science) that has been linked to the transition from primary to secondary school.

This project connected three science centres across Southern England and Wales. Each centre delivered the same *Joining Forces* show (Key Stage 2) to pupils from 25 primary schools each and then delivered a further *Forces* show (Key Stage 3) to five secondary schools (that the primary schools feed into). The evaluation covered both pupils and teachers and aimed at seeing how far the objectives of increasing

confidence and academic achievement (on the theme of Forces) during transition were met.

The method of evaluation was pre and post pupil questionnaires, before and after each of the *Joining Forces* shows as well as formative, post and delayed-post questionnaires for the teachers involved in the project. Generic Learning Outcomes (developed by The Research Centre for Museums and Galleries, Leicester University) were used in order to structure the evaluation. There are five Generic Learning Outcomes, 'Attitudes and Values', 'Knowledge and Understanding', 'Activity, Behaviour and Progression', 'Enjoyment, Inspiration and Creativity' and 'Skills'. The GLOs provide a method of measuring 'learning' in a more holistic way and enabled the monitoring of both an increase in knowledge ('Knowledge and Understanding' and 'Skills') and confidence ('Attitudes and Values' 'Activity, Behaviour and Progression' and 'Enjoyment, Inspiration and Creativity').

Taken as a whole, the results for the pupils showed a small overall increase in applied knowledge across the four questionnaires. The pupils were also able to demonstrate an overall increase in their ability to contextualize knowledge and apply their learning to a wider context. The results also showed that application of knowledge was most successful when a topic was covered in both the Key Stage 2 and 3 shows. An interesting connection was also observed between the pupils' most memorable moment of the show and an increase in correct answers relating to that item. The results did not show any significant increase in recall of facts (knowledge) after one show, but a small increase after seeing two shows. The results also showed that the pupils could not always retain information from the first (KS2) to the second show (KS3).

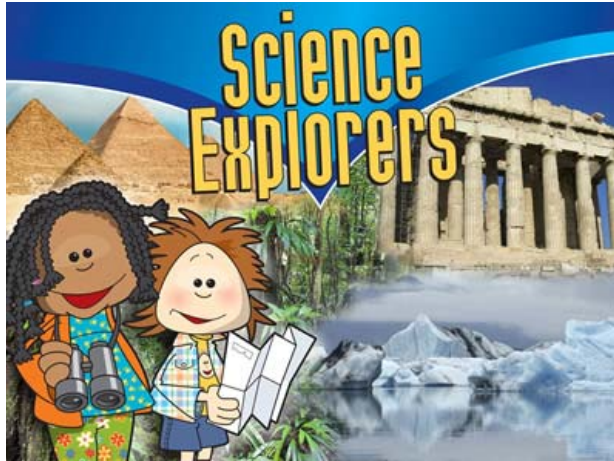
The completed Project Review Template (Appendix 3) gives centre feedback on the functionality of the pilot. Key elements from this have been incorporated into this report.

**Science Centre Enrichment Activities Grant**

**A model for identifying, training and evaluating non-science centre presenters  
in science centre outreach**

**Tina Crimp, Technquest**

**February 2008**



**This Project involved the following centres:**

- Technquest, Cardiff
- The Science Museum, London
- The Observatory Science Centre, Herstmonceux

## **1. Summary of the project**

A growing number of schools are unable to visit science centres due to socio-economic or geographic reasons. This is increasing the demand for outreach services. Often, there are barriers that prevent centres sending out their own presenters because they do not usually have staff free to work outside of the centre. This pilot project was designed to recruit and train non-science centre presenters to provide science centre outreach.

Both Technquest (Wales) and The Observatory Science Centre (East Sussex) are responsible for covering very broad and often rural areas. By working with the Science Museum to train individuals to go into schools, this model can help those hard to reach schools and those schools that would otherwise not be involved in a science centre experience. In addition, this project also looked to involve parents and other individuals, such as Science and Engineering Ambassadors (SEAs), in becoming fully trained science presenters.

## **2. Background of your consortium**

At the outset, it was decided that this consortium would be made up of three very different centres. One centre has over 14 years experience of developing and delivering programmes from Early Years to post-16 (Technquest) and one has limited experience of such work (Observatory Science Centre.) The Science Museum has developed and delivered the training programme for the new presenters, based on its experience, and evaluated the whole project formatively and summatively. The centres have worked closely with each other to share their experiences and there has been opportunity for the small centre staff to work with trainers, evaluators, and developers in the larger organisations which has provided important continuing professional development opportunities for all parties. We looked to develop a programme that could be used by other centres so it was important that our consortium had a mix of a very large and government funded centre, a large and part-funded centre, and a small centre with no core funding, and that within the consortium there was a mix of experience and resources.

### **Details of Consortium partners**

The Science Explorers consortium was formed between 3 science centres of varying sizes that included Technquest, Cardiff, The Science Museum, London, and The Observatory Science Centre, Herstmonceux. As indicated in the table below, the three centres vary greatly not only in annual income but also visitor numbers.



Consortium member	Total annual number of visitors to the site	Total annual number of schools visitors to the site	Total annual number of schools outreach pupils	Number of FTE staff	Annual Income
notes	(at your last end of year count, whenever this was)	(at your last end of year count, whenever this was). This should be portion of the number of total visitors	Approx full-time equivalent staff	What you last submitted to the charity commission / end of last financial year	Anything else you wish to add
Techniquet	179,000	47,000	43,000	74	£3 million
The Science Museum				789 Please note this is for ALL of NMSI, includes Trading co, front of house and 57 staff on fixed-term contracts. (ie not a ScM figure)	Income for 2006-07: £62.5 million  Please note this is for ALL NMSI. It includes Grant-in-Aid; restricted one-off Grant-in-Aid for specific projects (eg Library move); Trading and commercial income; sponsorship and donations
The Observatory Science Centre	58,000	20,000	2,000	8	£500,000

### 3. Science Explorers: The Project

#### 3.1 The background to your project

Many science centres are now starting to develop outreach programmes to target those schools that are unable, for economic or geographical reasons, to visit a science centre. This provides the centres with contact with their catchment areas, which may promote a later visit to the centre. One of the issues of running such a programme is that centres do not usually have staff free to work outside of the centre.

Techniquet, The Science Museum, and The Observatory Science Centre have worked together to develop a model to identify, recruit, train, and evaluate a pool of parents as presenters from schools in our catchment areas. The presenters will be trained in and will deliver a KS2 outreach show that will be developed in collaboration with the three centres based on tried and tested demonstrations.

### **3.2 Review of Project Objectives**

The partners aimed to develop and pilot a new outreach model and accompanying training programme for presenters that did not depend on using core staff to present shows in schools and the community. We developed a new KS2 show for presentation in schools. We then developed a model to identify, train and evaluate a pool of presenters to present this show in schools in our catchment areas. We aimed to recruit Science and Engineering Ambassadors (SEAs) from SETPOINT Sussex as they would already have been CRB checked and we worked with parents of children in the schools we targeted in North West Wales.

Objectives:

- To develop an interactive presentation on the Scientific Enquiry strand of the National Curriculum that can be transported to and delivered in schools
- To develop, with the three partners and teachers, pre- and post-visit resource materials for use by teachers to complement the show
- To work with schools and SETPOINT Sussex to identify and recruit presenters who could present the show in schools and act as role models: 'the presenter pool'
- To develop and run a training course for the presenter pool
- To trial the show in three schools in the catchment areas of two of the partners, targeting those schools that would not normally visit the centres
- To fully evaluate all aspects of the project
- To draw on the varying experiences of the partners to develop an exemplar for using a presenter pool to deliver outreach
- To supplement the professional development of the partners' staff by working with colleagues from different organisations
- To increase the interaction between the centres and the schools that do not generally visit the centres, so encouraging visits to the centres
- To build bridges between the centres and other science communication organisations in developing and running the project.

The consortium members worked together to draw out each other's strengths and shared best practice towards developing a model that can be used by other centres in the Ecsite-uk network for identifying, training and evaluating a pool of presenters.

All of the above aims and objectives were met with the exception of using SEAs through SETPOINT Sussex and visiting three schools in the catchment areas of two of the partners. It was decided by the Observatory Science Centre after the beginning of the project that the SETPOINT network was unsuitable for recruiting presenters to learn and deliver a show that the centre was going to use as part of their outreach programme in the future. As far as the number of schools was concerned there was not a lack of interested schools wishing to take part as witnessed by the number identified through Creative Partnerships in Sussex alone. However, while it would not have been a problem for experienced presenters, to present shows to three schools, due to the tight training schedule and the inexperience of the recruits, it was decided to visit a total of two schools, one in Northwest Wales and the other in East Sussex.

### 3.3 Detailed Project description

The theme that we chose to develop and present was Scientific Enquiry. Primary teachers with no science background beyond GCSE/O Level traditionally find this aspect of the KS2 National Curriculum difficult to teach. We aimed to bring together demonstrations to make up a new interactive science presentation. The show was further developed by Techniquest’s Project team (which has 20 years’ experience of exhibit building and 14 years’ experience in developing equipment for presentations) and by the Science Museum’s long-established and award-winning Learning team (who develop and run a wide range of exhibitions, shows and activities both within and outside of the museum.) Techniquest then developed the show kit, including design, technical development, fabrication, writing of the show script, translation of show script (into Welsh) and risk assessments and made a copy for each of the consortium members.

Two members of staff from the Observatory Science Centre team worked alongside Techniquest’s Education and Media team to develop the pre- and post-visit materials to accompany the show. They worked with Cardiff LEA to identify local primary school teachers who then worked in partnership with science centre staff on the development to ensure the materials were relevant to the curriculum. The proposed further refinements of the materials by the Observatory Science Centre team for inclusion on the web did not take place for logistical reasons including concerns that the material may be used inappropriately. The materials have been posted on the Techniquest website.

The Science Museum Learning Unit ran the presenter training programme at the two partner centres.

#### Summary of your project data

Total number of participants	Number of student participants	Number of adult participants	Number of participatory hours (participants x time spent with	<i>Total number of schools</i>

			them)	
8	approx. 240 KS2 pupils	10 teachers with their classes and 8 teaching assistants	50 hours of training x 8 presenters = 400 participatory hours	The Science Explorers show was trialled at 2 schools – one in East Sussex, the other in Northwest Wales.

Numbers of new school and teachers reached

Techniquet	Numbers
Number of schools you worked with on outreach before the project	0
Number of schools / students you worked with as a result of the project	1 school / approx. 60 pupils
What % of schools within your area have visited you	0% - there is no centre in Llanberis

The Observatory Science Centre	Numbers
Number of schools you worked with on outreach before the project	18
Number of schools / students you worked with as a result of the project	1 school / approx. 180 pupils.
What % of schools within your area have visited you	

Your definition of hard to reach schools

For Techniquet, it is the geographically remote schools and also the schools in Community First areas that we would term as hard to reach schools. Due to socio-economic and geographic factors, most schools in Wales have never had a Techniquet experience. By expanding our outreach programme with a new show and training presenters in the northwest of Wales, Techniquet will now be able to travel to the approximately 200 rural schools in Anglesey, Gwynedd, and Conwy, to enthuse the pupils with science.

For the Observatory Science Centre, again, the rural aspect of the East Sussex countryside is a limiting factor for schools to visit the centre. Also the catchment area includes regions identified as being underprivileged for socio-economic reasons. Schools within these areas often lack enough funding to support trips out to the centre, especially since the cost of transport has risen. Through the Science Explorers programme, they now have four fully trained presenters who will be able to present in schools, reaching many more pupils than would have either just come to the centre alone or were unable to for economic reasons.

### Charging for your projects

As this was a pilot project to identify and recruit non-science centre presenters to present an outreach show, the schools that participated were not charged for receiving the show. Now that the show has been trialled, improvements have been made to the script and the pre- and post-visit materials in line with comments made by teachers and the presenter trainees themselves. With these changes in place, both Techniquest and the Observatory Science Centre will actively market the Science Explorers show and charge schools who book it, thus helping to increase revenue streams for a sustainable future.

### Marketing approach

As each centre involved was aiming to attract slightly different adult presenters, the two methods used to recruit presenters for each centre will be explained.

#### The Observatory Science Centre

From the outset of this project, the Observatory Science Centre was aiming to attract SEAs into presenting science outreach shows through SETPOINT Sussex. However, this approach was not progressed and indeed was not required. Staff approached a volunteer who had done some work at the Observatory Science Centre in the past. After explaining the project, the volunteer was excited by the prospect of becoming a presenter. A second presenter was recruited following an interview for the position of outreach co-ordinator within the centre. Due to family commitments she was unable to take on the role but was delighted to be asked to be involved with the project. She was also able to recommend the third presenter. In total therefore, three presenters were recruited and a new member of staff at the Observatory was also trained.

#### Techniquest

It was initially the idea that Techniquest would recruit parents of school children in the northwest of Wales. This area suffers from high unemployment, and it was believed that the prospect of work and free training would entice a number of parents to become involved in the project. Gwynedd LEA was contacted to ask which schools would benefit most from this project and several names were put forward. After contacting the head teachers and explaining the project, bilingual (Welsh/English) recruitment flyers were sent to the schools. Initially only 3 schools were approached, but when no one

responded to the advertisement, several more schools were contacted. In total, more than 1000 flyers were distributed to schools in Northwest Wales, and no one responded. The local Job Centre Plus was also contacted and sent the flyer. Unfortunately, no one responded to the ad in the job centre either. An advertisement was placed in the local press, and three people replied to it. The fourth recruit found out about the project through word of mouth.

## **4. Impact of the Project on Partner Science Centres**

### **4.1 Collaborations and partnerships**

As a result of the Science Explorers consortium, a strong partnership has been formed between Technquest, Science Museum, and The Observatory Science Centre. It is very likely that the three institutions will collaborate on other projects in the future.

In addition, Technquest has had the opportunity to work closely with Gwynedd LEA to identify schools in the locality that could benefit from this project. Now that this contact has been made, it will be strengthened over time as we expand our outreach into this area, and we will liaise with them on further projects.

The Observatory Science Centre has worked as part of a Europe wide consortia on 2 different European Union funded projects (SkyWatch and DSpace). We have a close working relationship with SETPOINT Sussex through the recruitment of SEAs and are currently working with Creative Partnership on another consortium project, Culture Shared.

### **4.2 Driving Innovation and sharing Best Practise**

By working in this consortium, all three centres gained knowledge and experience from the other centres. It was not only the smaller centres learning from the largest, but vice versa. Both Technquest and the Observatory gained insight and first hand knowledge of the training programme provided by the Science Museum; The Observatory and Science Museum learned how Technquest produce pre- and post-visit materials with teachers input and guidance.

Another benefit that other science centres in the UK can gain from this project is the pre- and post-visit materials. These will be posted on our websites so that anyone can use these resources. Through our science centre network, this show will be advertised for anyone to use. In addition, as the show requires specially designed props, Technquest will offer to produce these at cost as all development costs have been paid for through this grant scheme.

### **4.3 Contribution to financial sustainability of consortium members**

For two centres just starting an outreach programme in new areas, the opportunity to be part of the Science Explorers consortium has been paramount to the success of our ventures. Neither centre on their own could have invested the resources in order to finance such a project. By having the Science Museum share their expertise in training, our new presenters are well equipped to continue presenting to schools in each area. After having this initial experience, the presenters will be able to learn more shows as they become incorporated into the programmes of each area, thus lending to the financial sustainability of each centre. This pilot project has also given the Science Museum, Techniquest and Herstmonceux insights into how each could outreach its products in the future.

The Observatory Science Centre has already taken the Science Explorers show to 2 more schools and has bookings for a further 4 schools. Two of the volunteer presenters have now been recruited as part time members of staff at the centre. The member of staff involved has acquired skills in science show presentation and as a result can train other staff. This is an invaluable asset to a small centre. Meeting members of larger science centres and maintaining contact with them will prove useful as a source of knowledge and help in future developments.

#### **4.4 Press activity**

In this instance, the press did not run any articles on the Science Explorers project. In general, however, all centres receive press coverage for special events on a regular basis.

#### **4.5 Other benefits (please specify)**

The meeting held at the BA Science Festival in York on 11 September 2007 was a very good experience for all SCEAG participants that were able to attend. It was an opportunity to meet others involved in the different consortia and to find out what the other consortia were working on.

One last benefit that has been realised through this partnership is the new contacts that have been made between the centres. Before this project, none of us had worked together, and now, as a result of Science Explorers, it is very likely that we will work together on future funding bids to further build our inventory of outreach shows.

As a small science centre it has always been difficult to make significant props for science shows. Having props made specifically for the Science Explorers show has given something that the Observatory Science Centre can strive to achieve in future show development.

## **5. Opportunities and plans for the future**

## **5.1 Follow on Actions**

Certainly for Techniquest, Science Explorers will be added to our Wales-wide outreach programme and actively marketed to schools for further use. With nearly 2000 primary schools located in the principality, this show will be an invaluable resource for KS2 teachers who are not confident in teaching science or the scientific enquiry strand of the National Curriculum.

The Observatory Science Centre will also continue to promote Science Explorers in East Sussex for the same reasons, not only as outreach. In addition, it may also be added to the programme of shows run at the centre and has set the standard for future show development. The props can also be used in shows with more specific themes such as forces.

## **5.2 Handover Plan**

Now that this pilot project has come to an end and refinements in the show and resources have been made, the product is now ready to be handed over to the Operations teams at each centre. At Techniquest, this is in the preliminary stages of hand-over with training of our Trainer, Presenter, Evaluator staff being undertaken by the Projects team. The Maintenance team will be in charge of repairing and storing the equipment when not in use. In Herstmonceux, due to the small nature of the centre, core staff have been involved with the project from the beginning, so no formal hand-over process will take place. Core staff involved will be responsible for the maintenance, repair and storage of the show kit.

As the show kit has been made in a very robust way, it is envisioned that with care, the show should have a life of approximately ten years. The only additional investment that will need to be made over this time period is for consumables used in a number of the demonstrations. Over the course of the show's life, these costs will be negligible.

## **5.3 Post Project Review Plan**

A post-project review would prove very helpful in the summer. As there is a British Interactive Group conference being held in Wrexham in July for science communicators, it is suggested that as many of the consortia members attend and share their best practice with others. The unfortunate consequence of this is that some centres may not be able to attend this meeting due to the expense of travel, subsistence, and conference fees. It has also been identified that a number of the consortia members will be at the ECSITE conference in Budapest in May which would be an ideal time to have a post project review meeting.

## **5.4 Recommendations for Future Enhancements to the projects**

We have been very lucky over the course of this project to refine both the presentation and resource materials that have been developed through this grant. As a result, it is



unlikely that any major enhancements would need to be made and that only small changes may occur as the show is taken on board by outreach staff at each centre.

## **6. Recommendations (Lessons learned)**

### **6.1 Recommendations relating to the collaboration**

- Future partnerships should ring-fence time and money for team-building on neutral territory at the beginning of a project. In addition, consideration should be given to funding partnerships of longer duration, such as two years.
- When training novice presenters, whether volunteers or casual staff, science centres should use existing, well-established and thoroughly polished shows that have been performed repeatedly in front of the target audiences. Having a highly experienced trainer to lead the training is also advisable.
- In developing a product – a show, other associated materials – science centres must draw upon the expertise of individuals with knowledge of local audiences and their needs.

### **6.2 Recommendations relating to project deliverables**

- Consideration should be given to funding partnerships of longer duration, such as two years. This would allow for a more solid working relationship to develop, which would result in a stronger project and final product overall, as well as allowing institutions to learn more from each other.
- Future partnerships should ring-fence time and money for team-building on neutral territory at the beginning of a project. Doing so would allow for smoother communication during the course of the project and would also allow for the establishment of detailed milestones at the beginning, which would further facilitate the smooth running of the project.
- Science centres must devote time and resources to implementing the model, particularly to recruiting, training and supporting volunteers. The success of the model depends on this. At least several weeks, if not longer, needs to be allocated for volunteer recruitment, if it is done remotely, by a science centre member of staff who is not in the same location as the training and delivery of the show.
- Because of the difficulty in recruiting volunteers, science centres may want to consider recruiting a pool of presenters, who would work on a casual, but paid, basis, as a way extending their reach. That is, it may be easier to recruit individuals to work on a casual basis than to recruit volunteers.
- In order to be successful, training needs to be at least 5 days, and trainees should be provided with food and reimbursement for travel.

- Ideally training time should be dedicated to presentation skills, in addition to teaching the show. However, if this is not feasible due to the short time frame likely to be available for training, the emphasis of the training should be on the show itself, with presentation skills incorporated into teaching the show.
- When training novice presenters, whether volunteers or casual staff, science centres should use existing, well-established and thoroughly polished shows that have been performed repeatedly in front of the target audiences. Doing so facilitates the training because the trainer knows how audiences will respond to various elements in the show and knows that the show works as intended. This understanding also makes it easier to communicate to trainees why the show is as it is. Having a polished show also enables the training to focus on simply learning the show, rather than on making improvements to the script, demos and props.
- When training novice presenters on a complex show, science centres should consider having them learn the entire show, but initially perform it in pairs. Doing so reduces the amount of stress on volunteers because there is always someone there to act as backup should something be forgotten or otherwise go wrong. It also makes the experience more enjoyable.
- Although trainees in the pilot study did not use it, on-line support from the trainer should be offered. This requires a dedicated named individual who can be reached via telephone and e-mail throughout the training until the delivery of the show. If a trainer external to the organisation is used, this would need to be incorporated into their contract.
- Having a highly experienced trainer to lead the training is also advisable because of the range of challenges that can come up and the amount of material that needs to be covered (e.g., the show itself, presentation skills) when training novice presenters.
- In developing a product – a show or other associated materials – science centres must draw upon the expertise of individuals with knowledge of local audiences and their needs. Doing so will help the product be more culturally sensitive and more appropriate for the intended audiences, which do vary regionally. Failure to be culturally sensitive will decrease the chances of success of the product with local audiences and could even damage the reputation of the science centre. In the current project, the changes were requested to the script (removing references to the Queen) and props (adding Welsh or bilingual labels) to be more responsive to local audiences.
- Science centres should consider making modifications, where possible, to shows to accommodate varying year groups of an audience, even within a key stage. For instance, the current show, Science Explorers, needed to have more challenging questions included when it was performed for an audience of Year 5 and 6 students, in comparison an audience of Year 3 and 4 students.
- Science centres need to allow several weeks for CRB checks to be performed (if necessary) for volunteers before they deliver a show in schools.

### 6.3 Assessment of project planning, delivery and other techniques used

Due to the short time scale of this project, both Techniquet and the Observatory felt pressured throughout the project. More time was required at the beginning of the project for team-building and brainstorming for the show script. Although training of the presenters took place over a very short period of time, it would have been much better for the training to have been conducted over two weeks because the presenters felt very pressures as well.

*'That's a lot to get through'.* (Volunteer, commenting on the show)

*'Yesterday [day 3] afternoon was pretty demoralising. It was just a step too far'.* (Volunteer, Sussex)

*'It's supposed to be fun for them but it isn't right now'.* (Science centre employee)

*By the time you get into the meat of a project, it's kind of time to finish it off – and that's when the relationship is just beginning.* (Partner)

On a positive note, because regular meetings throughout the project had been built into the schedule at the very beginning, it helped to keep the partners focussed and on track.

### 6.4 Analysis of Project Issues

One of the main issues that has come up over the course of this project for Techniquet and The Observatory Science Centre was that of time. Both centres learned a great deal from this project, especially the amount of time that it takes to manage and administer a project of this magnitude. This new gained knowledge will be applied in future projects undertaken by both centres.

## 7. Evaluation report

The key finding from the evaluation of Science Explorers are listed below.

#### *Outreach model*

- Non-science centre presenters can be trained, within a relatively short period of time, to successfully deliver a science show in schools.
- The experience of training and delivering a show is a positive one for trainees, increasing the likelihood that they will remain committed to the outreach programme.
- Implementing the outreach model is very time and resource intensive for participating organisations. For this model to be successful, organisations need to allocate staff time and resources for the recruitment of volunteers, ensure the volunteers are CRB checked,

allow at least five days for the initial training of presenters, dedicate budget to providing volunteers with food and travel reimbursement during the training, have an experienced trainer lead the training, adapt to volunteers' schedules (particularly if they are parents), and ideally have a well-established show on which to train volunteers.

- The dependency of the model on volunteers is an additional weakness that may deter future implementation, as recruitment can be extremely time-consuming and may be impossible in some cases. Volunteer recruitment is particularly difficult when the science centre member of staff responsible for recruitment is geographically distant from the location of the training and delivery of shows. In north Wales it was easier to recruit presenters as casual staff than as volunteers, which was all but impossible.
- Science centres participating in the pilot study also raised concerns about the sustainability of the model and the amount of ongoing support and further training that may be necessary to continue to use volunteers who have been through the initial training.

### *Training course*

- The trainees' expectations of the training course were straightforward: they expected to learn the show and to develop the necessary confidence to deliver it successfully. Observations and interviews with the trainees reflected that these expectations were fulfilled.



- The volunteers also expressed individual personal motivations for participating in the outreach programme, including sharing their enthusiasm for science and developing self-confidence.



- Trainees demonstrated enthusiasm for the project and were very engaged with and committed to the training itself. The training also seemed to foster a sense of ownership of the show.

- Having the trainees learn and perform the show in pairs seemed to increase their confidence and mitigate the stress of learning a complex, brand-new and unpolished show in a short time period. Providing food (lunch, tea, coffee) and reimbursement for petrol was an additional strength of the training, making trainees feel appreciated and valued.



- The trainees did not make use of the on-line mentoring available, but appreciated it being offered.
- The training programme had a number of positive impacts on trainees, including: improving their presentation skills, boosting their self-confidence and resulting in intentions to continue performing the show. In addition, three volunteers have since been hired as presenters (and two have delivered the show at least once since the original training).

### *The show*

- Schools hoped that the show would generate enthusiasm for science and offer another perspective on science. Teachers expressed no concerns about the use of parent volunteers to deliver the show.
- Teachers and students responded positively and enthusiastically to the show. It was an interesting and enjoyable experience, and students seemed to learn from it.



- Although the pre- and post-show materials could not be trialled with the students, teachers felt they would be useful, particularly as a way of following up on elements of the show.
- Modifications to the show needed to be made to accommodate audiences in north Wales, and it was felt that materials such as signs in the show and the pre- and post-show resources should have been made available in Welsh or Welsh/English bilingual.

### *Partnership*

- All of the partners spoke positively about their involvement with the project and felt that it had been a beneficial experience overall. The development of relationships with individuals in other institutions and learning about how other institutions operate were mentioned as particularly positive outcomes.
- 
- It seems that the smallest partner, who had only recently begun to offer outreach, had learned the most as an institution, but all organisations had contributed to the project.
  - The tight time scale of the project was the biggest challenge to working in partnership. It impacted the show, resulting in a rushed development process, and had implications for the development of the partnership itself.
  - All of the partners felt that a longer planning stage at the beginning of the project would have been extremely useful. It would have allowed for more team-building early on, which would have facilitated later communication, particularly during development of the show. It also would have enabled the development of a detailed set of milestones for the project, which is likely to have enhanced the success of the project.

## Appendix 1: Budget for your project

A closing final cost plan/cash flow showing all expenditure under headings supplied with your baseline documents. This is the last 'updated cash flow' you usually submit with your financial claim.

	March 2007	July 2007	November 2007	February 2008	Total
R & D	560	28466	19964	8938	57928
Delivery			16321		16321
Evaluation			984	10800	11784
Meetings	1687	3582	3208	1214	9691
Closure reports and accounts				3000	3000

## Appendix 2: Schedule for your project

As with the above please provide a final programme to completion giving % complete for all items. If some items are not 100% please explain why, when and how 100% delivery will be met.

Milestone	Milestone partners	Date and duration
Three partners and teachers view demo ideas for show on them of scientific enquiry	All	100% complete
Consortium meeting 1/3/07	All	100% complete
Show research and development	All	100% complete
Consortium meeting 30/4/07	All	100% complete
Development of show kit including design, technical development fabrication, script writing and translation into Welsh	Techniquet	100% complete
Create three copies of the above	Techniquet	100% complete
Centres work with schools	Techniquet and The	100% complete

and SEAs to find potential presenters. Information sessions to be held. It is hoped that this process will be informal and through natural selection presenters will come forward.	Observatory Science Centre	
Development of pre- and post-show materials with teachers and translation into Welsh	Techniquet and The Observatory Science Centre	100% complete
Consortium meeting 6 and 7/8/07	All	100% complete
Development of training module and associated presenter pack.	Science Museum	100% complete
Pre- and post-show materials completed and put on web.	The Observatory Science Centre	100% complete
Presenters trained with core members of consortium team. Annie Devitt to run training.	Science Museum	100% complete
Presenters undergo further training in Techniquet and the Observatory Science Centre with in-house staff and begin presenting in schools shortly thereafter.	Techniquet and The Observatory Science Centre	100% complete
Consortium meeting 25/10/07	All	100% complete
Centres to present show in targeted schools	Techniquet and The Observatory Science Centre	100% complete
Pre- and post-show materials to be evaluated	Science Museum	100% complete
Summative evaluation of programme	Science Museum	100% complete
Consortium meeting 26/2/08	All	100% complete
Report and final accounts	Techniquet	100% complete



## Appendix 3: Quotes

### Volunteer Quotes

It's a completely different audience from what I've done before. (Volunteer, Sussex)

It's a chance to see how working with older kids goes – to sort of test the waters with kids who are older than mine. (Volunteer, Sussex)

I was a bit nervous about the science, but it is for primary school kids. (Volunteer, Sussex)

I'm nervous, but I figure they wouldn't send us out to the schools unless we were properly trained. (Volunteer, Wales)

Getting that balance (needs related to the scheduling of the training) is important. (Volunteer, Sussex)

I'm thinking of going back to work – maybe as a teacher – and this might give me the confidence to do that. (Volunteer, Sussex)

It really brings together lots of my interests and experiences – my knowledge of science, knowledge about kids, and amateur dramatics. When I do the shows, hopefully I can put into practice the skills I've learned over the years (and from the training) – and maybe spark kids' interest too! (Volunteer, Sussex)

I hope the shows will get across my excitement and enthusiasm for science – maybe make them think and trip off a whole new level of interest. (Volunteer, Sussex)

I think any experience that builds my confidence would be good – because I'm normally quite shy. (Volunteer, Wales)

'That's a lot to get through'. (Volunteer, commenting on the show)

'Yesterday [day 3] afternoon was pretty demoralising. It was just a step too far'. (Volunteer, Sussex)

'It's supposed to be fun for them but it isn't right now'. (Science centre employee)

We've got it sorted – and I don't have to do the bits that make me nervous!  
(Volunteer, Wales)

It's so much fun! (Volunteer)

It's our show. (Volunteer, Wales)

The way [the trainer] expressed such confidence in us – it really helped build our own confidence. (Volunteer, Sussex)

All of those practical ideas really helped – so we'd know what to expect and what to do. (Volunteer, Sussex)

I was impressed how she managed to train such different people. (Volunteer, Wales)

Teaming us up just made the whole experience much more pleasurable.  
(Volunteer, Sussex)

Going straight into doing the show really helped – there was no time to get scared. (Volunteer, Wales)

Having the refresher day was essential, so we could find the weak points and tighten them up before Friday (the day of the show). (Volunteer, Sussex)

Having all the meals, and the petrol covered – that was really nice.  
(Volunteer, Sussex)

I think I've become so much better at presenting. (Volunteer, Sussex)

I've learned more in these two days than in a term at (performing arts) college! (Volunteer, Wales)

It was a real confidence boost – I was very nervous about presenting to

primary school kids, but now I know I can. (Volunteer, Sussex)

I had really lost my confidence – I almost didn't go to the training at all. But now I'm confident that I can take over my parents' business (presenting historical characters in schools.) (Volunteer, Wales)

I felt privileged to be a part of it – it was brilliant! (Volunteer, Sussex)

I would do it again in a heartbeat! (Volunteer, Sussex)

Evaluator excerpts

When we arrived at the Observatory, all 3 moms were reviewing the script in the café – and they all had worked on their cue cards the night before. One trainee had even missed breakfast because she'd been reviewing the script. (Excerpt from field notes)

They all got into figuring out how to make the rocket demo work. (Excerpt from field notes)

One volunteer thought it would be better with just A and B on the voting cards (even black letters on a white background) – the other trainees agreed. (Excerpt from field notes)

They agreed that doing it in pairs would be really good. One volunteer commented that while one person is talking, the other can do cue cards, score, set up etc. The other added that there was just so much to remember – the experiments, awarding points, teams, talking, sequence. (Excerpt from field notes)

Later that afternoon:

Two volunteers talked about how they'd divided up the show, and one said that she thought it had 'really clicked'. They told the trainer they were feeling more confident

- Trainer – 'it'll be great!'

- Volunteer – 'I can actually believe you this time. I'm feeling a bit of optimism. It's going to be great fun' (Excerpt from the field notes)

One of the trainees volunteered to make a corrected version of the graph at

home – and what he brought in reflected that he had spent quite a bit of time on it. (Excerpt from the field notes)

The rocket demo is problematic again – it's just going a couple of feet, even though the first day, it had gone far. Two of the trainees tried to problem solve around this and tried to figure out how to make it work better. One noted that the neck of the bottle was getting bigger, so maybe they needed a new bottle each time. (Excerpt from the field notes)

There had not been time to make a second seatbelt for Billy (the puppet) for the go-kart demo. So, the volunteer suggested using her own belt, took it off, and strapped in the puppet! (Excerpt from the field notes)

There was a fair amount of discussion around the tablecloth demo – should the characters have tea with the Queen? Two thought it might be ok, but two other trainees thought not. So, they decided to have the characters have tea with their grandparents instead (who are likely to have china teacups...) and even use the Welsh words for 'nan and granddad'. (Excerpt from the field notes)

There was a discussion about what language the show should be presented in. One of the trainees suggested doing the food labels on magnets – with one set in English and one in Welsh. (Excerpt from the field notes)

School quotes (teachers and pupils)

They were very engaged – and these are difficult kids. If you can get them engaged, you can get anyone! (Teacher, Sussex)

Everyone enjoyed it and it's much easier to remember things if they have been enjoyable. (Deputy Head, Sussex)

It was a good fit with the curriculum. (Teacher, Sussex)

It was good as a starter for lots of different topics. (Teacher, Wales)

It was active – there was always something coming up. (Teacher, Sussex)

It was very visual and tangible, so they could see what worked and didn't work. (Teacher, Sussex)

It was great how it was quizzing the kids and getting them to generate ideas.  
(Teacher, Sussex)

It was very interactive. Having students in teams was good because they could all participate. (Teacher, Wales)

I liked all of it. (Sussex, multiple students)

[One thing from the show I did not like was:] Nothing! It was great! (Year 5 or 6 student, Wales)

That science can be very interesting. (Year 5 or 6 student, Sussex)

The part where two fluids mixed together to make a solid. I learnt that it won't just mix, change colour or explode! But make a solid. (Year 5 or 6 student, Sussex)

Gravity is very powerful. (Year 5 or 6 student, Wales)

I learnt how if you use force on a table cloth (sic) the thing that is on top of it will not fall. (Year 5 or 6 student, Wales)

#### Partner Quotes

The best part about the project was meeting other people and having those contacts. Now I have people I can work with on other projects – I can just ring them up.

We have a show, Science Explorers, which has set a standard of knowledge, script, resources and props.

It's good to see what other centres are doing, what their constraints are, and some of the different ways they do things like developing shows.

We had not realised how much went into the development of a new show and this insight has been invaluable.

We have realised that it will be beneficial to our outreach development to have school(s) and teachers that are prepared to be guinea pigs for us

We had never produced any pre- or post-materials as we had only recently begun our outreach. It was good to learn how Techniquest go about this and then to meet up with a teacher, and then to write the materials.

If we were to do this project again, we would ensure that a realistic time scale was set in the early stages.

There was so much excessive back and forth-ing by e-mail. If we'd had a second meeting, it may have helped considerably.

All partners have to feel equally involved in the process, and have things to gain from it. And that probably works best when those goals are set out right at the beginning before a project starts.

By the time you get into the meat of a project, it's kind of time to finish it off - and that's when the relationship is just beginning.



# NORTHERN OUTREACH

Ian Simmons – The Centre for Life

18 February 2008

Eureka! - Splash

## **This Project involved the following centres:**

- The Centre for Life – Newcastle Upon Tyne
- Eureka! – Halifax
- Museum of Science and Industry - Manchester
- Ryedale Folk Museum – Hutton Le Hole

## **1. Summary of the project**

Northern Outreach is intended to take entertaining, interactive, curriculum linked science shows out to schools in the North of England (roughly between Yorkshire's southern border and the Scottish border) that have not made use of other STEM enrichment activities and to follow this up with CPD to their teachers to help equip them to use some of the show techniques in their own teaching. The project targeted upper primary/lower secondary children.

The partnership has involved 4 diverse institutions united in their interest in hands-on science learning, a major science and technology museum, a children's museum, a large hands-on science centre and a small rural folk museum. All had worked with at least one other partner before, but never all together. It has proved a very fruitful experience for everyone as all had things to learn from others, but our common goals enabled us to collaborate most harmoniously.

Northern Outreach has reached **221** hard to reach schools and **17,547** children. This has been a very rewarding and far-reaching project, but as it has been for one year and involves a small amount of money that could not be spent on core costs it has had minimal effect on our organisations' sustainability. It just gives a taste of what science centres could achieve with significant investment in their work.

## **2. Background of your consortium**

The Centre for Life is the lead partner and is a large Millennium Project hands-on science centre with an emphasis on genetics and biotechnology based in a science village in Newcastle city centre where cutting edge research is also done, particularly on stem cells. Life's audience is partially urban, in the Newcastle/Gateshead conurbation, with a large sparsely populated rural hinterland across Northumbria, Durham and Cumbria. It receives in the region of 220,000 visitors per annum. Life brought experience of running outreach projects and expertise in secondary education and developing science shows

Eureka! Is a children's hands-on museum based in the centre of Halifax. Its audience is partially urban, drawn from the central Yorkshire cities, but with a catchment that also includes a large area of rural North Yorkshire. It receives over 230,000 visitors per

annum. Eureka! Brought experience of running outreach projects and expertise in primary education.

The Museum of Science and Industry (MOSI) in Manchester is a large science and technology museum with a hands-on gallery in central Manchester. Its audience is largely urban, drawn from the Manchester conurbation. It receives **xxx** visitors per annum. MOSI brought experience of urban outreach

Ryedale Folk Museum is a small museum in Hutton-Le-Hole, Yorkshire. It has not previously covered science, and Northern Outreach is its first venture in this area. It's audience is almost totally rural. Ryedale brought the ability to reach an area of the north not readily accessible to the other partners and an experience of working in rural areas.

The partnership was formed because we all had interests in developing our outreach activities to enable us to get to schools that did not normally use them or come to our centres due to cost/distance concerns and that if we worked together we could actually serve the entire North of England.

There were considerable challenges in reaching our audience in that the majority were in distant isolated rural schools that took considerable amounts of time to reach, sometimes via roads that could become impassable in bad weather, one that was visited was 30 miles from the nearest A-road. Other urban ones were in areas of significant decline that were not culturally accustomed to using external service providers.

## **Details of Consortium partners**



Consortium member	Total annual number of visitors	Total annual number of schools visitors	Number of FTE staff	Annual Income	
Eureka!	230,856 in 2007	32,635 in 2007	50	£1 million	
Centre for Life	220,000 in 2007	35,000	80	£6 million	Annual income is from all sources including our commercial and property arm
MOSI	408,469	76,632	102	£5.1 million	
Ryedale Folk Museum	41,032	11,028	3	£229,668.38	

### 3. [Projecting Science]: The Project

#### 3.1 The background to your project

##### NEED

All partners were aware of schools within their catchment that had never used external STEM providers and from discussion with teachers and advisors it was clear that this was more due to practical constraints than unwillingness. This indicated that there was a need for this kind of project as by funding outreach to such schools it removed the practical constraints preventing them using such provision.

##### EXPERIENCE

As well as providing diverse science and technology exhibitions, consortium members have the following experience

**Eureka!** - Has delivered a number of outreach projects over the last few years including *First Steps*, an environmental project enabling 4,000 primary children from disadvantaged communities to make positive actions with issues of sustainability, *Pirates!*, a Community Theatre programme for families in Ilkley enabling children to learn about geographical features through role-play and drama, *Interstellar Cinderella*, an interactive pantomime which focused on the Earth and Beyond. Other outreach packages include *Mission: Active Future*: a travelling exhibition housed inside a customised trailer designed to inspire children to make positive healthy lifestyle choices and *Splash!*: an interactive science show created to support National Science and Engineering Week

**Ryedale** - The museum launched its science initiative in 2005 with a series of projects followed up by STEM fairs. In March 2007 they ran an inset day for secondary science teachers supported by SETPoint North Yorkshire. In

their business plan they state they will build on our initiatives to use the collection with supporting material to engage and inspire our visitors in science.

**MOSI** – Runs science and planetarium shows and a science festival in October, as well as “meet the scientist” activities, family programmes and an adult lecture series. Schools outreach was piloted in 2004-06, demonstrating demand for a programme like Northern Outreach.

#### **Centre for Life**

- Live science shows,
- An interactive dome theatre and planetarium
- Family-based laboratory workshops
- An extensive schools programme based on a suite of laboratories and debating rooms
- An annual lecture and debating series featuring popular and respected science communicators
- Outreach activities to local schools
- Newcastle Science Festival

### **3.2 Review of Project Objectives**

- Schools will be targeted with the assistance of local educational partner organisations such as Science Learning Centres, SETPoints and LEAs to pinpoint those in need of additional STEM activity, ensuring a mix of schools based on educational need.

*All partners successfully worked with the kinds of bodies identified to identify the appropriate schools to visit*

- This targeting will take into account the need to reach under-represented groups and DfES statistics will be part of the matrix used in the identification process along with Government indices of deprivation.

*In working with these external bodies to target the schools visited, these methods were successfully used*

- The aim is to target schools that are not being reached by STEM activity from museums, science centres and other providers. The areas that will be covered by this outreach programme will include inner cities, metropolitan areas and also some of the most isolated and deprived rural communities in England in parts of Northumberland where people can be 30 miles from the nearest main road.

*Consortium members reached schools in all the areas described, including Alston, England's highest and most isolated high school*

- Each centre in the consortium will take science shows out to 50 schools in the North of England during the duration of the project (200 schools in all).

*As the money allocated to the project was lower than in the bid, the number of schools to be visited also had to be reduced to 42 per partner. All partners achieved this, and MOSI significantly exceeded it as their schools were in urban areas allowing two to be visited in a day, while the other partners were visiting isolated rural schools.*

- Staff from each centre will participate in 10 collaborative days to develop new materials and deliver CPD in support of this delivery.

*All partners successfully worked together on collaborative days, but the collaboration gelled so well that in the end 10 days were not necessary to achieve what we needed.*

### **3.3 Detailed Project description**

Northern Outreach took science shows out to schools who, through reasons of deprivation and /or isolation had not made use of external STEM providers in their science teaching. Shows were delivered by one or two staff going out in a van with appropriate equipment to visit the target schools to perform the show.

Each centre started by taking out a science show they already used in-house, then the consortium jointly developed a Forces show which all centres then had the opportunity to use.

The target audiences were upper primary/lower secondary students at the KS2/3 transition

#### **Quotes (for additional quotes from users see Evaluation section)**

Eureka! – Feel The Force

From teachers

*'You included all 60 children with their responses through actions and noises. You made a possible "dull" concept fun. The children have come back full of all they have learnt. It was like watching an "outstanding" lesson.'* Year 3/4 teacher from Selby.

*'The presentation was excellent and very colourful. It was set at the right level for the children and relevant to previous work completed in class. It was fun and the children really enjoyed it.'* KS1 teacher from Leyburn, North Yorkshire

*'This is the first opportunity for you to visit and it's definitely something I would like to see more of in our school, perhaps with shows linked to specific QCA units in specific year groups.'* Year 3 teacher from Hawes, North Yorkshire



Centre For Life - Sound

From pupils

*'If you scrunch a piece of paper up and you have a flat piece of paper and you drop them at the same time, the ball of paper will get to the floor fastest.'* Year 6 pupil from Selby

*'That's the first time I've found science fun!'* KS2 pupil from Selby.

Ryedale – H<sub>2</sub>O

*"I wish I was you."* Year 3 pupil Lancaster.

*"It was funny and an interesting way of learning not like lessons because you can join in."*  
Year 6 pupil from Drifffield.

From teachers who attended the CPD day

As a result of attending the CPD day I intend to....

*'Have cross-curricular science days throughout the whole school (we're very small). KS2 Teacher from Leyburn, North Yorkshire.*

*'Encourage the rest of the staff at my school to regard science investigations as fun and not something to be nervous about.'* KS2 teacher from Richmond, North Yorkshire.

*'Run a science club in school and look at visiting Eureka!'* KS2 teacher from Thirsk.



MOSI – Supermarket to Sewers

## **Summary of your project data**

Difficult to do this as we don't all collect the data in the same format

### Numbers of new school and teachers reached

We're not able to provide a reliable figure for this as Ryedale's record keeping is not up to recording this

### Your definition of hard to reach schools

We selected the schools to visit by consulting with LEAs. We asked them who, in their view were schools in their catchment that were hard to reach with external STEM provision, so it is their definitions that were used and these will have varied from LEA to LEA. In essence though, it was a school that had not used an external STEM provider for at least 3 years and was either in an area of inner city deprivation or in a remote rural community

### Charging for your projects

Workshops were not charged for by most consortium members, although Eureka! Charged a small booking fee (£20) to prevent last minute cancellation, as this is their policy with all bookings.

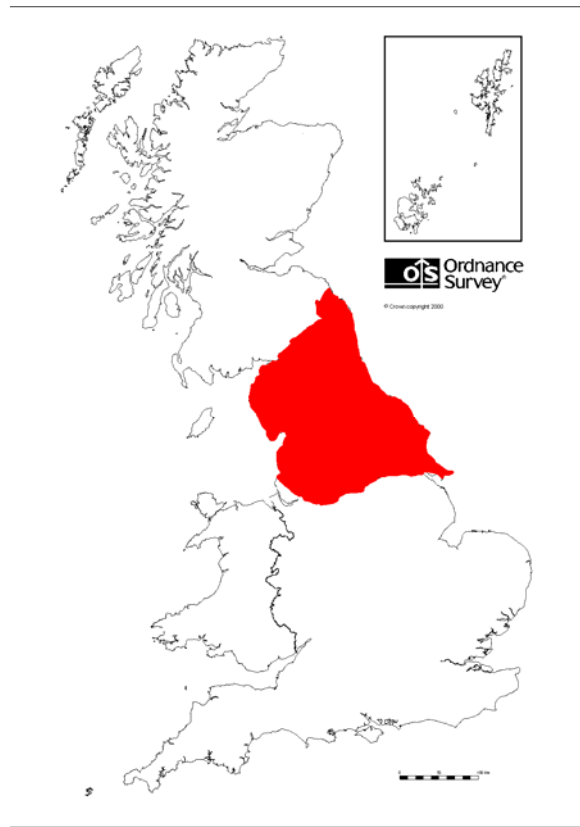
We did not charge because the reason most schools had not used external STEM providers recently was because they were short of funds.

We are seeking alternative funds to continue delivery without charging so we can continue to serve the target audience. If this is not forthcoming partners will offer the outreach at a charge, but this will make it unavailable to the current target audience, instead it will be taken up by the enthusiastic and affluent schools that already use our other services

### Marketing approach

Very little marketing was required. Some leaflets and information was distributed by some partners, but mostly it was direct marketing. Having liaised with LEAs to identify potential target schools they were telephoned directly and offered free outreach, almost all accepted immediately. All the required places to meet our initial targets were filled by this method, and exceeded.

### **Picture of the projects across the nation**



Area served by Northern Outreach

## **4. Impact of the Project on Partner Science Centres**

### **4.1 Collaborations and partnerships**

Northern Outreach was very useful in building on previous partnerships between members and melding them into a larger, more effective one. The Northern Outreach partnership has been a significant success in that all partners are enthusiastic about both continuing the project if suitable funding can be secured and in working together on new projects.

During the project the partners have all collaborated with their local SLCs and LEAs (in the case of Life, 11 different LEAs) and in both Manchester and Newcastle, there has been involvement with the Science Cities.

#### **4.2 Driving Innovation and sharing Best Practise**

Northern Outreach was not particularly innovative in what it did, rather it enabled the partners to utilise their existing knowledge in the service of schools that had been unable to make use of external STEM providers before.

It was exceedingly useful in sharing best practice. Different partners had expertise in different environments and different parts of the curriculum and working together as a consortium enabled this to be shared very effectively between partners. This was of particular use to Ryedale Folk Museum whose staff gained a huge amount of knowledge and benefit from working with larger more experienced organisations. All the partners will be putting things they learned to immediate use in other projects they are planning

#### **4.3 Contribution to financial sustainability of consortium members**

All the centres involved in Northern Outreach had previously worked in partnership with at least one other consortium member, but this has been the first time all four had worked together. We have found this a most effective partnership and intend to continue it into the future, in the first case to raise funds to enable us to continue the Northern Outreach project for a further 3 years. It has been of particular benefit to Ryedale Folk Museum because they are by far the smallest participant (approx 38000 visitors a year) compared to the others (over 200,000 visitors a year each) and they have been able to learn considerable amounts from working with the larger institutions. For them, this has allowed them to take on extra staff and boost the skill levels of the organisation, at least temporarily. As funding for this project is of fixed term there is no guarantee that money will be available to retain such staff if they can find this, it will contribute to their long-term sustainability. For the others involved this project involved the use of existing skills, although additional staff were recruited for the duration of the project and these will have learned new skills. In the cases where it has been possible to integrate such staff into the teams of the centres when the SCEAG funding ends, skills will be retained, but these posts are likely to be existing vacancies rather than additional posts. It has allowed Ryedale to get involved in delivering science communication activities, which they had not been before, and this will assist with the museum's future sustainability as it gives them a wider range of options for attracting users

Northern Outreach has been extremely effective in meeting the aims we set for ourselves at the start. We aimed for each Centre visiting 42 Schools that had not previously used our services either due to isolation, as has been the case for those targeted by Eureka, Life and Ryedale, all of which have huge sparsely populated rural catchments, or inner city deprivation as is the case with Manchester. All of us have achieved this, and in the case of Manchester where distance is not a factor and it is possible to visit 2 schools a day, almost doubled this. We specifically went for a target of schools visited rather than students reached as many of the schools we were not reaching previously were not using our services as they were not only isolated but very

small as well, if our concentration had been on numbers, such schools would have ended up being excluded from this project as well. However, we did manage to reach some of Britain's least accessible schools, including Alston in Northumbria, which is both Britain's highest and most isolated secondary school and we view the coverage we achieved to be a resounding success. The shows we took out were enthusiastically received and we feel it has given us a strong mandate to seek funding to continue and extend what we have achieved with SCEAG money.

However, this project has had minimal impact on the financial sustainability of most of the consortium members. To put it in context, the full amount of the money that came to the Centre for Life was just over 0.5% of the organisation's annual turnover and the entire amount for the entire project for all the centres across the whole country for the whole year amounted to one-sixth of the amount that The Centre for Life alone spent on its recent Rediscover-funded redisplay, which in itself did not fully redisplay the centre (at least a further £1.5 million is needed to do that).

A project that increases the potential of centres to the point where it has a significant affect on financial sustainability needs to either contribute to the day to day running costs of centres in the way Renaissance in the Regions does for museums, or in some way contribute to the transformation of their ability to attract public in the way that Renaissance also has, or that Rediscover did as a one-off. Schools form a minority of science centre users and projects like SCEAG, while very useful in helping us serve this small market better, do not really tackle the key factors that lead to sustainability

- i) Recognition that Science Centres, like museums and other cultural institutions such as museums or opera houses will never achieve financial stability purely from user-generated income and require extra streams of income to subsidise this
- ii) Inroads into minimising the level of extra support such institutions need can only really be achieved by increasing the number of paying public visitors, rather than schools as the latter are always smaller in number and pay less for services.

The SCEAG Funding we have received will enable us to do a small amount of additional outreach in the future as it has funded the equipment to allow this and for which we will be able to charge should we wish to, which would add to our income, but it is unlikely to be enough to significantly affect our financial stability. Were we to do this, it would, however, fail to continue the spirit of Northern outreach as it would mean we would only end up reaching schools who could afford to pay whereas the point of the project is to reach those who can't.

It will allow us to apply for additional funding from other funders to continue to offer outreach to the schools it is meant for, but this is also unlikely to affect financial stability as such grants, in common with SCEAG, are likely to stipulate that the funds are not spent on core costs, only on project delivery, and it is funding core costs that will influence financial stability. It will enable us to sustain a small and very worthwhile project though, and this is something we feel would be extremely important.

These were Enrichment grants not support grants. We believe SCEAG needs to be judged on its own merits, as a very successful small project to enrich and improve



science centre's services to schools, it has never been anywhere near the size of a project that would have a significant effect on centres' financial stability and it would be a pity if it was judged on its ability to do this.

#### **4.4 Press activity**

Hard Copy mailed separately

#### **4.5 Other benefits (please specify)**

There were considerable benefits for the participating organisations in that we were able to share best practice in all sorts of ways and get insights into the way we all worked. This was particularly useful for Ryedale as they have only 3 staff, all relatively new to the field and they have learned a lot from working with the large institutions and forged links that will help them in the future as the rest of us will assist them informally with new developments now. It also led to some useful sharing of fundraising expertise at the final consortium meeting where we looked forward to how we might fund ourselves to continue this work – Ryedale staff particularly found the insight into fundraising opportunities useful and applicable to wider aspects of their operation.

### **5. Opportunities and plans for the future**

#### **5.1 Follow on Actions**

The Northern Outreach partnership has been a significant success in that all partners are enthusiastic about both continuing the project if suitable funding can be secured and in working together on new projects.

#### **Handover Plan**

The equipment etc will continue to be maintained and used by the teams who have been using it, so no handover is necessary.

Life of the equipment will depend heavily on its future use and exact nature. As a rough rule of thumb I would expect:

Show props – 1-3 years  
Computers – 3 Years  
Vehicles – 5 years

#### **Post Project Review Plan**

It depends what you mean by a post-project review. For a very small project like this, I would not expect to carry out a further review after the closure and final evaluation report. For the national project I would suggest an external consultant with extensive experience in the field be brought in to review the project using data we have already provided and that this be done within 3 months

## **Recommendations for Future Enhancements to the projects**

It would depend on how the funding for the next phase is derived. Ideally we would like to have a full time team of at least two people funded to do this work, there is certainly enough demand from schools that cannot afford to pay for it.

I would also want to dramatically reduce the reporting load. For this project the amount of work required to make claims etc has been in excess of that required for major grants from the like of Wellcome. If we seriously want to enhance centre's sustainability, loading staff with lengthy bureaucracy that diverts them from activities that are more likely to meet their mission and bring in funding is not the way to do it. For any future funding we seek an important factor will be whether the compliance work is proportionate to the funds received. It has not been in this case.

### **6. Recommendations (Lessons learned)**

#### **6.1 Recommendations relating to the collaboration**



1. Agree a common aim at the start, but leave organisations' delivery flexible enough that they can achieve this in the way best suited to their particular nature
2. Share what you learn from doing this regularly so all partners can make use of each other's innovations
3. Make sure all the staff involved in managing and delivering the project understand and believe in what it is doing. For Northern Outreach having a group of people like this has made it extremely easy to have happy and productive relationships with each other
4. A collaboration is a meeting of minds, not a pile of paperwork.

#### **6.2 Recommendations relating to project deliverables**

#### 6.3 Assessment of project planning, delivery and other techniques used

The planning for this was relatively simple. The consortium meetings and circulated emails were sufficient to keep everyone in tune with what the rest of us were doing and to work together to refine the collaborative show after the days when staff worked together to create it.

The delivery was the tried and tested "person with a van" method and this worked well throughout with no major issues arising. The timing of the project start did cause a problem for delivery in that with a start of the project in March, the actual outreach was not ready until April once staff had been recruited etc and this meant that it then hit Easter holidays, followed by SATS, so schools were not able to accommodate outreach visits until well into the summer term, which meant that there were relatively few visits in the 06/07 school year. With the project having to complete by middle-end February this largely limited delivery to the autumn term, which as our numbers show was not impossible, but it did mean that there was more pressure on staff who were delivering the

shows than was ideal. Having the project in synch with a school year would have worked better.

The actual techniques for content delivery were ones that were proven successes in science centres and on other outreach projects and were also successful here

#### 6.4 Analysis of Project Issues

This project ran very smoothly at the collaboration and delivery end, but there were major issues in the way it was set up and the reporting.

- The application timing was poor. Information was issued just before Christmas with an application deadline early in the New Year. This made developing considered applications hard, especially when consortia had to be formed. Ideally a 3 month period between issuing information and the closing date is preferable, and if it is short, not spanning the Christmas holiday.
- Expecting the project to start days after the decision to fund was announced. Normally we would expect again, at least a month and often 3 to be allowed for preparation before it was expected that we'd have the project on the road. This in effect happened by default, but it could have been better structured
- Expecting the project reporting and evaluation to be in at the same time that the project delivery was supposed to end. It has made information gathering for the report difficult. Normally I would expect 1-3 months to elapse between the end of delivery and the reporting/claim deadline.
- It would have been better to announce Early January 07 with a end of March deadline, for a project delivery start in September (overlapping 2 school years was unwieldy and impeded momentum), running until the following July when school term ends, with reporting and claims in for the beginning of the next September. This would have minimised strain on centres and maximised the effectiveness for schools.
- As mentioned elsewhere the amount of reporting has been excessive for the amount of money granted. It would be larger than expected if it was for one centre, but when it comes to gathering data from 4 centres, following up missing elements, dealing with inconsistencies etc, this quickly becomes a major task. This has not been helped by the fact that the information we have been required to submit has grown at virtually every submission point. Consortium members, particularly small ones, have found it very difficult to devote staff time to report in the detail needed and it is arguable that diverting staff into large amounts of paperwork actually undermines their sustainability rather than enhances it.
- It is more usual for grants of this size to have one or two claim points in the year, for this to be done on a submission of an expenditure spreadsheet and major invoices. At the end there would be, as mentioned a gap between end of programme and reporting deadlines, particularly for evaluation as time is often needed to gather and process all the data and that the final report would not be more than something like a relatively short for or 4-5 sides of text.

## 7. Evaluation report

This should include the impact of this project on your audience, as well as evaluation of the functionality of the pilot

I attach the evaluation summaries for each show from each centre

### MOSI

#### Supermarkets to Sewers (17.09.07-30.01.08)

**Please note: Any percentages which don't add up are due to blanks being left**

<b>How many schools visited?</b>	34			<b>How many children saw the shows?</b>	3297			
<b>Number of completed evaluation sheets:</b>	Children		2400	Teachers		81		
<b>CHILDREN'S RESPONSES</b>								
<b>Number of children per age (years):</b>								
<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
12	42	577	486	585	580	118	0	0
Best describes how much you enjoyed the science show				85.6%		12.8%		1.3%
The things I learnt today were ...				82.7%		14.8%		2.2%
				(Interesting)		(Okay)		(Boring)
The science show was ...				74.4%		21.8%		3.5%
				(Easy to understand)		(Okay)		(Hard to understand)
<b>What amazed you most about the science show?</b>								
<p>As is shown in the figures above, the majority of our feedback has been positive. All areas of 'Supermarkets to Sewers' Science Show have been mentioned through either drawings or words. The most commonly mentioned parts of the show are 'Burping' and 'Poo' as you may expect from KS2 children!</p> <p>Many questionnaires feature images of children participating in demonstrations with happy expressions on their faces.</p> <p>A large number also recall facts from the show:</p> <ul style="list-style-type: none"> <li>An adult's small intestine is 670cm in length</li> </ul>								

- The small intestine is longer than the large intestine
- Some people in other countries eat frogs legs, fried spiders and squirrel brains

### **Anything else you'd like to tell us?**

Many pupils expressed an interest in visiting the museum or viewing the science show again. Positive words such as: interesting, fantastic, amazing and exciting are regularly used. Comments also included the desire to learn more, or further questions that they'd like answered (i.e I'd like to learn how the brain works)

Several children commented that the show was explained well and helped them to understand.

## **TEACHER RESPONSES**

### **What did you like about the science show?**

The teacher comments were very positive common words used to describe what they liked included:

Interactive, lively, practical, visual, informative, child friendly, easy to understand, fun.

Some commented on Q & A session after:

- "They asked good questions at the end which showed you had made them think!"

### **Is there anything you think we could have done better?**

A large number of teachers left this question blank or simply entered "No"

Some improvements have been recommended though:

- "Allow extra time for questions at the end" – This has been possible in some schools although it is something we will take into consideration when making future bookings.
- "Link more closely to healthy eating topic" – This will be reviewed at the end of the project. One solution would be a change in the show summary as this will make it clearer to what extent healthy eating is currently covered by the show.
- "A quiz using PowerPoint at the end" – This has been incorporated into the new outreach show and seems to work well. When this show is reviewed it will be an element we consider including.

Some teachers commented on isolated circumstances from individual performances:

- "A more lively presentation"
- "I couldn't hear very well"

- Neither of these comments has been repeated so hopefully do not represent many teachers' experiences.

**How would you rate the science show?**

	<b>Excellent</b>	<b>Very good</b>	<b>Average/OK</b>	<b>Not very good</b>	<b>Poor</b>
Presentation	<b>58.0%</b>	<b>34.6%</b>	<b>4.9%</b>	<b>0%</b>	<b>0%</b>
Content	<b>50.6%</b>	<b>46.9%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>
Relevance to NC	<b>40.7%</b>	<b>46.9%</b>	<b>6.2%</b>	<b>0%</b>	<b>0%</b>
Length	<b>39.5%</b>	<b>51.9%</b>	<b>7.4%</b>	<b>0%</b>	<b>0%</b>
Enjoyment	<b>71.6%</b>	<b>27.2%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>

**Any comments?**

As is shown in the table above over 90% of teachers rated the presentation, content, length & enjoyment of the show as either 'Excellent' or 'Very Good'. The curriculum relevance was given a slightly lower rating of 87.6%. There were however several comments about the relevance:

- "Relevance was excellent for yr 3, average for yr 4"
- "The show related very well to the science unit of work. Teeth & eating, which we have just started in class."
- "Digestion not really covered in depth in curriculum - more to do with teeth, healthy eating, breathing, organs, skeleton, muscles, heart, life cycles"

We will review the show content before our next outreach project with a focus on bringing the level of curriculum relevance up.

Comments about delivery – enthusiastic, lively presentation

Further comments about enjoyment:

- "Don't change it!"
- "Very enjoyable"
- "The wow factor of the length of the small intestine was excellent!"

	<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
<b>Have you visited our science museum/centre before?</b>	<b>75.3%</b>	<b>18.5%</b>	<b>1.2%</b>
<b>Has your school visited our science museum/centre before?</b>	<b>45.7%</b>	<b>16.0%</b>	<b>32.1%</b>

**What would enable you to visit with your class in the future?**

Over half of the teachers who responded to this question cited the cost of transport as a factor that limits school trips.

A few teachers requested information about relevant sessions we offer at MOSI and a couple of teachers said they have visits planned.

	Yes	No	Don't Know
<b>Has the science show made you think about new ways to teach science?</b>	<b>79.0%</b>	<b>7.4%</b>	<b>2.5%</b>
<b>Would you have us back again?</b>	<b>93.8%</b>	<b>0%</b>	<b>0%</b>

**Anything else you would like to tell us?**

Comments included:

- "This roadshow really helped us with revision (science) listening (literacy). FUN cross curricular approach. Thank you"
- "The resources were really good and the children had something to keep their attention at all times."
- "A super demonstration many thanks"
- "If you could visit us again that would be much appreciated. I know you do talks on recycling which would be useful. Thanks"

**Feel The Force – (17.09.07-30.01.08)**

**Please note: Any percentages which don't add up are due to blanks being left**

<b>How many schools visited?</b>	34	<b>How many children saw the shows?</b>	2857					
<b>Number of completed evaluation sheets:</b>	Children	1790	Teachers 43					
<b>CHILDREN'S RESPONSES</b>								
<b>Number of children per age (years):</b>								
<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
0	141	295	411	393	443	106	1	0
Best describes how much you enjoyed the science show				85.0%		12.9%		1.4%
The things I learnt today were ...				76.7%		19.6%		3.0%

	(Interesting)	(Okay)	(Boring)
The science show was ...	74.6%	21.4%	3.0%
	(Easy to understand)	(Okay)	(Hard to understand)

### What amazed you most about the science show?

As is shown in the figures above, the majority of our feedback has been positive. Each area of 'Feel the Force' Science Show has been mentioned through either drawings or words.

The majority of pictures show Ted the character in our show as he helps illustrate the forces. E.g. Ted on a parachute, Ted being blasted off on the rocket, Ted bandaged up, Ted in the middle of tug of war rope. Galileo's balls falling at the same time is also a common image.

The content of the show has varied since the beginning of the project, over the first couple of months it was continually adapted to best fit into the 30 min time slot to include the correct amount of content to be explained sufficiently. This was done by experimenting with omitting different demonstrations; biscuit tin rolling up slope, skateboard, final rocket. Due to the inconsistent final content, it is hard to determine the overall favourite demonstration. The script has been finalised now to fit either 30min or 45min time slot.

Some children drew themselves or friends participating in demonstrations and others drew related pictures such as space ships or rockets which the show prompted them to think of.

### Anything else you'd like to tell us?

Many pupils expressed an interest in visiting the museum or viewing the science show again. Positive words such as: interesting, enjoyable, fun, good were used on many questionnaires.

One child made a lovely comment which shows how the show affected them and hopefully will be something that stays with them through school and beyond.

*"I realized that science is really important"*

## TEACHER RESPONSES

### What did you like about the science show?

The teacher comments were positive as is shown in the table below.

Common responses included the phrases:

Engaging, informative, lots of child involvement, well presented, practical demonstrations, fun and visual.

Several commented on Ted, our Bear character present throughout the show:

- "Using Ted to get points across to children"
- "They were engaged by Ted and it was very relevant to the yr 5 curriculum"
- "Liked the running theme of Ted throughout the science show – perfect for my yr 2 class. The children had the opportunity to engage in the learning all the time."
- "Teddy!"

### Is there anything you think we could have done better?



A large number of teachers left this question blank or simply entered "No"

Recommendations which were made:

- "Include a push, pull, twist dance for clarity and fun"; "Music included would have helped" (yr 3); " Perhaps some video clips of different forces to follow up demonstration and put into an everyday context" – These will all be points we consider when we review this show at the end of the project.
- "Longer session" – This maybe so that we can include more detail or to allow more time for questions during and at the end. More time is being allowed for future bookings,
- "Include activities which can't easily be done by ourselves." - This was an isolated comment. The show content will be reviewed at the end of the project.
- "More children participation" – This was an isolated comment. Selected volunteers, total audience participation and individual questions are all elements of this show. It would be hard to incorporate more participation in the time slot without cutting down on content. If a longer session is developed, additional child participation will be considered.
- "Element's were maybe a little hard for yr 2 i.e Newton & Galileo however good grounding for yrs 5 & 6" – We will review the age this show is offered to for future bookings.
- "It was a shame we had to rearrange this due to your staff illness - it would have been more effective at the start of our unit." – This was unavoidable but fortunately only affected a small number of shows.

**How would you rate the science show?**

	<b>Excellent</b>	<b>Very good</b>	<b>Average/OK</b>	<b>Not very good</b>	<b>Poor</b>
Presentation	<b>48.8%</b>	<b>48.8%</b>	<b>2.3%</b>	<b>0%</b>	<b>0%</b>
Content	<b>51.2%</b>	<b>41.9%</b>	<b>7.0%</b>	<b>0%</b>	<b>0%</b>
Relevance to NC	<b>60.5%</b>	<b>39.5%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>
Length	<b>51.2%</b>	<b>37.2%</b>	<b>9.3%</b>	<b>2.3%</b>	<b>0%</b>
Enjoyment	<b>55.8%</b>	<b>39.5%</b>	<b>4.7%</b>	<b>0%</b>	<b>0%</b>

**Any comments?**

Mixed comments about suitability:

- "Bit too long for KS1 to sit still!"
- "The show was most suitable for the younger children and although all the content for KS2 forces was covered there was nothing that we do not do in school."
- "A really good resource for us to use. It brings variety to the subject and

<p>demonstrates activities we would find difficult to do with a restrictive budget. Thank you - much appreciated.”</p> <ul style="list-style-type: none"> <li>• Very good show enjoyed by children, lots of very relevant and fun experiments - brill!</li> <li>• Science presented in a fun but structures manner. Children were challenged and encouraged to question.</li> </ul> <p>Positive comments on delivery:</p> <ul style="list-style-type: none"> <li>• The lady presenting the workshop did very well in a noisy hall. Thank you.</li> <li>• Well delivered and held the children’s attention</li> <li>• The show was very informative and very well presented</li> </ul>			
	<b>Yes</b>	<b>No</b>	<b>Don’t Know</b>
<b>Have you visited our science museum/centre before?</b>	<b>67.4%</b>	<b>30.2%</b>	<b>0%</b>
<b>Has your school visited our science museum/centre before?</b>	<b>41.9%</b>	<b>14.0%</b>	<b>25.6%</b>
<b>What would enable you to visit with your class in the future?</b>			
<p>The most common response included the cost of transport involved for school trips.</p> <p>A few teachers requested information about sessions we offer at MOSI relevant for their children. – Information has been sent out to these teachers.</p>			
	<b>Yes</b>	<b>No</b>	<b>Don’t Know</b>
<b>Has the science show made you think about new ways to teach science?</b>	<b>58.1%</b>	<b>28.0%</b>	<b>7.0%</b>
<b>Would you have us back again?</b>	<b>95.3%</b>	<b>0%</b>	<b>2.3%</b>
<b>Anything else you would like to tell us?</b>			
<p>Comments included:</p> <ul style="list-style-type: none"> <li>• <i>“Gave me some interesting ideas for introducing the topic to a class. Thank you.”</i></li> <li>• <i>“It was very enjoyable - thank you.”</i></li> <li>• <i>“All children enjoyed the show.”</i></li> <li>• <i>“Thank you for a very good presentation. The children were motivated by the subject.”</i></li> <li>• <i>“Do you have KS1 presentations other than forces? We would be interested in science shows for our younger children.”</i></li> </ul>			

**Centre for Life**

**Centre for LIFE**  
**Northern Outreach Evaluation Summary Sheet**

<b>How many days delivering outreach?</b>	47				<b>How many children saw the shows?</b>	4023		
<b>Number of completed evaluation sheets:</b>	Students		1742		Teachers		74	
<b>CHILDREN'S RESPONSES</b>								
<b>Number of children per age (years):</b>								
<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>		<b>Blank</b>
16	167	1458	1423	636	277	46		0
Best describes how much you enjoyed the science show				67%		28%		05%
The things I learnt today were ...				64%		31%		5%
				(Interesting)		(Okay)		(Boring)
The science show was ...				62%		33%		4%
				(Easy to understand)		(Okay)		(Hard to understand)
<b>What amazed you most about the science show?</b>								
<ul style="list-style-type: none"> <li>- No consistent winner but the following were specifically mentioned by at least a hundred children in each case: <ul style="list-style-type: none"> <li>o The Band</li> <li>o The instruments</li> <li>o Hearing range experiment</li> <li>o Bats, Dogs and ultrasound</li> <li>o Elephants and infrasound</li> <li>o Dustbin drum</li> <li>o Infra sound ghost story</li> <li>o Loudness</li> <li>o The participatory ear model</li> <li>o Ear binoculars</li> </ul> </li> </ul>								
<b>Anything else you'd like to tell us?</b>								
<p>If the children chose to comment here it was always on a positive note. Some chose to write or draw about another favourite part of the show or describe a fact that they remember. Others would say how they'd enjoyed the show in general and were going to try some of the experiments at home.</p> <p>A selection of their comments are given below.</p> <ul style="list-style-type: none"> <li>• We liked the thing that made the noises with the bat detector</li> <li>• I thought it was really interesting and I learnt loads about different things about sounds tha I didn't know about.</li> <li>• I thought it was brilliant, please come again</li> <li>• I liked the bit where they banged the bin</li> <li>• Are you coming back in?</li> <li>• It's good to have volunteers because it's not just the helpers, we get to have a go. Super! Fab!</li> <li>• I thought that the instruments were good and strange</li> </ul>								

- The elephant bit was fascinating
- i am so glad they came along because that was much better than literacy and art
- It was interesting and I learned a lot (sic) , it was very fun, thanks for a great afternoon

## TEACHER RESPONSES

### What did you like about the science show?

Teachers responded positively, as would be expected with the starting question. By far the most important factor was the interactivity (46%) specifically mentioned interactivity.

Others liked it because it was engaging, enjoyable. Interesting, entertaining or fun (27%). Teachers specifically the variety of equipment and range of demonstrations (27%). Finally, the solid educational context in which underlies the show was recognized (31%).

A selection of their comments are given below.

- *very good - kept children engaged for over an hour. Good range of interactive activities*
- *Staff extremely friendly and knowledgeable. Excellent rapport with children.*
- *You did really well. Thank you for taking the time to listen to advice about the hearing impaired children*
- *Thanks so much for the opportunity to experience the show. We always appreciate different ways of delivering*
- *I learnt new things too.*
- *It was interesting with some great examples which engaged everyone*
- *We would love to have you back as often as possible - more than happy to act as a test audience for future shows!*
- *Pupils interest kept very well.*
- *I thought it was very interesting, entertaining and provided a fun learning environment*
- *Do you visit doing forces/electricity - a topic year 6 find 'tricky'? The ear demo - great idea*
- *very good, excellent way of learning*
- *Enjoyed the show, nice to see interaction of pupils*
- *Thank you for including us in the 'pilot' - we'd love to be included again*

### Is there anything you think we could have done better?

In the main, suggestions were constructive. We had one show where inexperienced staff failed control a year group of 12 year olds properly and the criticisms were harsh but justified. The main suggestions from primary teachers would be to reduce the length of show and to have even more of the audience engaged with activities.

- *Crowd control! Don't talk over the children - wait and make them stop*
- *At this time of year (Christmas) with the children being fussy - some strategies need developing to bring the children back down.*

- *Sitting too long on floor*
- *A little long, maybe less content so that the understanding was greater*
- *Too long for some children*
- *More student involvement*
- *More interactive with actual instruments*
- *More interactive things for all children to do*

<b>How would you rate the science show?</b>					
	<b>Excellent</b>	<b>Very good</b>	<b>Average/OK</b>	<b>Not very good</b>	<b>Poor</b>
Presentation	35%	49%	11%	5%	
Content	39%	49%	12%		
Relevance to NC	37%	55%	8%		
Length	21%	45%	26%	7%	1%
Enjoyment	38%	46%	14%	1%	1%

**Any comments?**

- There was little difference between the comments in this section and those offered in *what did you like* and *what could we improve* sections. As a result, we have included these comments in the appropriate category above.

	<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
<b>Have you visited our science museum/centre before?</b>	50%	34%	
<b>Has your school visited our science museum/centre before?</b>	34%	28%	20%

**What would enable you to visit with your class in the future?**

When asked about reasons why they did not visit life, the expected answers were the most frequent.

<b>Reason for not visiting LIFE with class</b>	<b>Number</b>
Money	21
Transport difficulties	11
Time / distance	3
Knowing what is on	3

	<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
<b>Has the science show made you think about new ways to teach science?</b>	90%	4%	6%
<b>Would you have us back again?</b>	98%	2%	

<b>Anything else you would like to tell us?</b> <ul style="list-style-type: none"> <li>• <i>Again, these comments mirrored the positive and negative comments so have been included above.</i></li> </ul>		

**Eureka!**

**Northern Outreach Evaluation Summary Sheet**  
**February 2008**

<b>How many schools visited?</b>	50	<b>How many children saw the shows?</b>	4334
<b>Number of completed evaluation sheets:</b>	Children	2902	Teachers 113

**CHILDREN'S RESPONSES**

**Number of children per age (years):**

2	3	4	5	6	7	8	9	10	11	12	Blank
4	3	16	41	123	468	562	632	765	268	3	17

Best describes how much you enjoyed the science show	<b>90%</b>	<b>9.5%</b>	<b>0.5%</b>
The things I learnt today were ...	<b>82%</b> (Interesting)	<b>17%</b> (Okay)	<b>1%</b> (Boring)
The science show was ...	<b>82%</b> (Easy to understand)	<b>16%</b> (Okay)	<b>2%</b> (Hard to understand)

**What amazed you most about the science show?**

**Splash!**

The vast majority of pupils' responses were positive. The giant bubble was by far the most popular demonstration but the lava lamp and density experiments were also frequently mentioned. Every part of the show was mentioned as a favourite on at least one evaluation form, showing that the show achieved its aim to appeal to a wide range of ages and learning styles.

It is obvious that the children found the show very enjoyable to watch but they also remembered a lot of the scientific facts:

- *"In Yorkshire we use 140 litres of water each day."*
- *"The hot water was lighter than the cold water so it stayed on top."*
- *"There is more than 1 million trillion litres [of water] on earth."*
- *"That the water we use now is from the dinosaur years."*

**Feel the Force!**

The most popular elements of the show were the rocket and the catapult, with 35% and 27% of children mentioning them, respectively. As with Splash!, nearly all other

elements of the show were mentioned by at least one pupil, demonstrating that the show contains something for every child. The evaluation forms prove that the children found the show entertaining but also educational:

- *“The fact that amazed me the most was when I found out that when heavy things are dropped with little things they land at the same time.”*
- *“This amazed me the most that on the moon the bag of potatoes was lighter.”*
- *“If you scrunch a piece of paper up and you have a flat piece of paper and you drop them at the same time, the ball of paper will get to the floor fastest.”*
- *“That it doesn’t matter how heavy or light objects are, they all hit the ground at the same time. But if they are a different shape then one will hit the ground first.”*

### **Anything else you’d like to tell us?**

#### **Splash!**

It is clear from the children’s evaluation forms that the show achieved its aim to promote science as fun and exciting. 98% of their responses were positive and the children have obviously been inspired by the experiments they have seen:

- *“I am going to make a lava lamp at home.”*
- *“It was brilliant and I would love to see something like this again.”*
- *“I would love to come to the Eureka! centre in Halifax.”*
- *“Are you allowed to do this at home?”*

The project’s tagline “inspiring young people about science” is perfectly encapsulated by one child’s response *“I wish I was you.”*

#### **Feel the Force!**

98% of pupils’ responses were positive and the children obviously enjoyed learning in an informal and practical way:

- *“It was fascinating and the experiments helped me understand how things work.”*
- *“It was funny and an interesting way of learning not like lessons because you can join in.”*
- *“Science seems so much easier now and more fun!”*
- *“It has made science so fun.”*

A few of the older children, however, felt that some of the science was too easy:

- *“It was good but I knew a lot of it, it would be better if it had more facts.” (Aged 10)*
- *“Some parts were too easy. Fewer jokes, more science.”*
- *“I wanted to know more about the push, pull and twist and gravity and friction.”*

The show is aimed at the whole of KS2 and includes simple facts, e.g. push and pull, but also more complex ideas such as the difference between mass and weight. Comments like these show the children have been inspired by what they have seen and are keen to learn more.

The children were very eager to volunteer and a few comments (from both pupils and teachers) expressed disappointment at not being more involved with the demonstrations:

- *“We would all like to join in.”*
- *“More chances to have a go with the demonstrations.”*

The show already uses twelve volunteers and two activities call for whole audience

participation. Again these comments show the children's enthusiasm for the subject. The teachers' pack contains details of further experiments that can easily be repeated in the classroom or at home, so all children can be involved.

One little boy approached the presenters at the end of the show saying, *"That's the first time I've found science fun!"* Hopefully other children will have been as inspired.

## TEACHER RESPONSES

### What did you like about the science show?

#### Splash!

92% of teachers rated the science show as "Excellent" or "Very Good" over all five assessment criteria. The most popular factor with teachers proved to be the interactive and visual nature of the show:

- *"The interaction with the children was great. A lot of very interesting tricks and facts."*
- *"Interactive activities which kept the children totally focused."*
- *"The range of visual, auditory and kinaesthetic activities. You included all 60 children with their responses through actions and noises. You made a possibly "dull" concept fun."*

Many teachers commented on the combination of science and fun:

- *"It was good to see science being promoted as an interesting and enjoyable subject."*
- *"The show was fun and exciting with a lot of science content."*
- *"Lots of learning combined with action and fun. Some complex ideas made accessible to 7 year olds."*

The content of the show was also praised, with teachers commenting on links to the National Curriculum:

- *"Exciting, interesting, informative, linked to National curriculum."*
- *"The presentation was excellent and very colourful. It was set at the right level for the children and relevant to previous work completed in class. It was fun and the children really enjoyed it."*
- *"Showed what fun science can be. It wasn't at all like a lesson but reinforced work already studied."*

#### Feel the Force!

95% of teachers rated the science show as "Excellent" or "Very Good" over all five assessment criteria. Teachers mentioned the interactive elements of the show and the practical approach to science. It was also commented that all the equipment was readily available and inexpensive, making the demonstrations easy to repeat in the classroom:

- *"Very practical, involved the children, lots of participation."*
- *"Excellent use of demonstrations in child friendly language."*
- *"Good selection of simple experiments that backed up the facts."*
- *"All the equipment was readily available/inexpensive so easy to repeat. Supported NC."*



The presentation style of the show was praised:

- *“Presented whole forces topic in a very short snappy way.”*
- *“Very visual and kinaesthetic resources – very inclusive for the children.”*
- *“Good presentation, brisk pace and precise, clear explanations.”*

The teachers appreciated a science show focusing on what is often perceived as a difficult topic to teach. Many teachers used the show as an introduction to Forces or as a revision exercise before SATS:

- *“Fun, enjoyable way to present what can be a difficult topic for children to understand.”*
- *“Children were engaged with science show and obviously had a good understanding which was clear in their responses.”*

### **Is there anything you think we could have done better?**

#### **Splash!**

Some teachers suggested that a few of the demonstrations may have been too complicated for younger children:

- *“Some parts difficult to understand for the age of the children. Hopefully they will remember experiments as they progress through school.”*
- *“Possibly two shows, one for KS1 and one for KS2.”*

Splash! is aimed at KS1 and KS2 and incorporates experiments suitable for a range of ages. There are plenty of simple visual science tricks to appeal to younger children. One audience included a small group of nursery children, who loved the insta-snow and the giant bubble. However, these comments have been taken into consideration and Eureka!’s next show “Feel the Force” is aimed exclusively at KS2.

Another teacher suggested a quiz at the end of the show to recap all that the children had learned. The new show now includes a game of “True or False” as a summary.

Other issues raised related to staging and organisation:

- *“Some experiments were hard to see for children at the side. They said they couldn’t see because of the laptop lid. I moved them but this could be a consideration for the future.”*
- *“Maybe make some things easier to see, it was difficult for the children at the back to see some of the experiments but that is our hall.”*

The very nature of an outreach show means that the staging can be an issue as school halls come in all shapes and sizes. These problems have been addressed with the purchase of a small projector stand and ensuring that presenters stand to the side when the PowerPoint is being used.

#### **Feel the Force!**

The only negative comments were concerning audience sizes in the early shows. It was noted that pupils at the back could not see all of the demonstrations.

- *“Some of the explanations were difficult to hear at the back and “Flash” spoke*

*quite quickly at times.”*

- *“When doing the grass vs ice demo, having it on a table so everyone can see.”*

Audience sizes have now been reduced to eliminate this problem.

Most of the pupils were very eager to volunteer and many teachers felt they would have benefited from more interaction. Some teachers even suggested working on investigations in small groups:

- *“More opportunities for all children to interact, have an opportunity to try experiments. Smaller groups of children. Follow presentation by opportunities to test out ideas.”*
- *“More activities for the children, mini investigations?”*

Although working in small groups would help to consolidate children’s learning, the format of a science show does not lend itself to this. The show contains several opportunities for audience participation and the teachers pack has ideas for investigations to try back in the classroom, if the teacher feels this would be advantageous.

In response to these comments, Eureka!’s future outreach programme will offer a variety of activities. Teachers will be given the option of:

- An additional hands-on activity session for the whole class following the science show, *or*
- A 45min problem solving session for small groups of children, in place of the science show.

These approaches will cater for different learning styles and all children will have the opportunity to be involved with at least one experiment or demonstration. By working with smaller groups, the presenters will be able to tailor the sessions to the individual ages and abilities of the children.

#### **How would you rate the science show?**

<b>Splash!</b>	<b>Excellent</b>	<b>Very good</b>	<b>Average/OK</b>	<b>Not very good</b>	<b>Poor</b>
Presentation	51%	42%	7%		
Content	49%	48%	3%		
Relevance to NC	54%	38%	8%		
Length	49%	40%	11%		
Enjoyment	69%	31%			

#### **Any comments?**

- *“All children were interested, even the teachers learnt something new.”*
- *“Excellent show. The scientific phrases used were reinforced with a practical way of remembering them.”*
- *“Children loved the bubble – good mix for both older and younger children.”*

<b>Feel the Force!</b>	<b>Excellent</b>	<b>Very good</b>	<b>Average/OK</b>	<b>Not very good</b>	<b>Poor</b>
Presentation	51%	41%	8%		
Content	49%	49%	2%		
Relevance to NC	61%	39%			
Length	46%	39%	15%		
Enjoyment	70%	30%			

**Any comments?**

- *“Some children will recall the show due to the visual displays - good examples of a difficult concept.”*
- *“All the children were motivated and engaged in the activities.”*
- *“Very entertaining and well presented.”*
- *“The children really enjoyed it - it was a fun way of doing important revision.”*
- *“Super interaction with the children and made fun through lots of humour. Thank you.”*
- *“Not long enough! Could some activities (paper dropping, air resistance) be done by all children?”*

	<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
<b>Have you visited our science museum/centre before?</b>	52%	48%	
<b>Has your school visited our science museum/centre before?</b>	32%	44%	24%

**What would enable you to visit with your class in the future?**

Only 32% of schools had definitely visited Eureka! before. The main reasons given for this was the cost of transport for such long distances:

- *“Bus journey would be too long for 6/7 year olds.”*
- *“Transport grant. It's always such a problem for schools in remote rural areas.”*
- *“The entry cost would need to be cheaper because the coach would cost a lot and it would be more than we could ask our families.”*

While it may be impractical for schools to bring a class group to Eureka!, it may be possible for children to visit with their families. With this in mind, vouchers have been produced entitling one child free entry to the museum when accompanied by a full paying adult. These vouchers have been distributed to all children that have seen a science show as part of the Northern Outreach project.

	<b>Yes</b>	<b>No</b>	<b>Don't</b>
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			<b>Know</b>
<b>Has the science show made you think about new ways to teach science?</b>	<b>73%</b>	<b>24%</b>	<b>3%</b>
<b>Would you have us back again?</b>	<b>100%</b>		

**Anything else you would like to tell us?**

**Splash!**

- *"You're staff are lively and make learning come alive."*
- *"This is the first opportunity for you to visit and it's definitely something I would like to see more of in our school, perhaps with shows linked to specific QCA units in specific year groups."*
- *"Brilliant show! It has made us all aware of how much water we use and how we can save it."*
- *"Very entertaining and at the right level for the children."*
- *"An excellent show. You even managed to keep the nursery children interested for half an hour which is not easy."*

**Feel the Force!**

- *"Just thank you. We really enjoyed the show."*
- *"I enjoyed it, very informative, thanks."*
- *"Thank you for a great afternoon."*
- *"A fantastic, entertaining and educational performance."*
- *"If there was a follow-up workshop that would be perfect."*

**Ryedale**

**Ryedale Folk Museum – H<sub>2</sub>O on the go!**  
**Northern Outreach Evaluation Summary Sheet**

<b>How many days delivering outreach?</b>	32	<b>How many children saw the shows?</b>	2170		
<b>Number of completed evaluation sheets:</b>	Children	674	Teachers	31	

<b>CHILDREN'S RESPONSES</b>								
<b>Number of children per age (years):</b>								
<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>Blank</b>
10	76	75	95	130	150	103	28	7
Best describes how much you enjoyed the science show				94.5%		5%		0.5%
The things I learnt today were ...				88%		10.5%		1.5%
				(Interesting)		(Okay)		(Boring)
The science show was ...				77%		20%		3%
				(Easy to understand)		(Okay)		(Hard to understand)
<b>What amazed you most about the science show?</b>								
<ul style="list-style-type: none"> <li>- Loopy Layers: 5%</li> <li>- Floaty Egg: 1%</li> <li>- Lava Lamp: 26%</li> <li>- Water Gel: 4%</li> <li>- Snow: 4%</li> <li>- Giant Bubble: 53%</li> <li>- Card Game: 1%</li> <li>- Everything!: 6%</li> </ul>								
<b>Anything else you'd like to tell us?</b>								
<p>If the children chose to comment here it was always on a positive note. Some chose to write or draw about another favourite part of the show or describe a fact that they remember. Others would say how they'd enjoyed the show in general and were going to try some of the experiments at home.</p> <p>A selection of their comments are given below.</p> <ul style="list-style-type: none"> <li>• <i>I thought everything was really, really good.</i></li> <li>• <i>I thought the lava lamp was quite clever. And I thought the experiments were easy and fun to understand so you can do them at home!</i></li> <li>• <i>Water is not only used for cleaning and drying, it can be used for lots of tricks. For example you can make water disappear...or make an egg float...</i></li> <li>• <i>It was really fun and I think we should do it again.</i></li> <li>• <i>I want to do it every science lesson.</i></li> <li>• <i>It was the best science show I have ever seen. I'm going to try some experiments at home!</i></li> <li>• <i>The science show was brilliant.</i></li> <li>• <i>I loved the show, it amazed me how many things you can do with water, thank you.</i></li> <li>• <i>Well really I liked everything and I loved learning about water and I loved you tricks.</i></li> </ul>								

<b>TEACHER RESPONSES</b>
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**What did you like about the science show?**

Teachers responded with a variety of points in this section and due to the nature of the question they were extremely positive. They were impressed with the whole of the science show, particularly the experiments demonstrated and the use of volunteers. Many commented how the show worked well across the key stages with all the children being engaged. They appreciated the fact that all of the activities could be continued back in the classroom or at home.

A selection of their comments are given below.

- *Good presentation and range of activities. Also gave children facts about water.*
- *It was really interesting and most of the experiments were simple and easy to do in the classroom. It was well presented at the children's level.*
- *The children really enjoyed all the activities and predicting what would happen. All the things we were shown the children could try at home.*
- *It was pitched just right for the children and the length of time was spot on. We all really enjoyed it. Thank you.*
- *Good mix of practical things to do and information. Very good, clear, loud presentation.*
- *Interesting. Presented well and at a level the children could understand.*
- *Good communication with both KS1 & KS2. Content excellent.*
- *Its magic approach, which was later explained showing what made things happen. It held the children's interest and kept surprising them!*
- *Child friendly, entertaining, interactive and informative.*
- *The visual aids were very good. The children were really focused and enjoyed participating in the activities.*
- *An excellent range of exciting experiments with just the right amount of scientific background for the age of the children. Children involved in experiments too.*
- *The variety of different elements to the show which helps to keep children's interest. It was very visual and came across as fun and exciting. Follow up activities for the children to try at home – lots have tried them!*
- *I thought the science show was very good. It was well presented and kept the children's attention. The flow was good and there was a variety of info.*
- *The children loved the tricks! I thought the song was an excellent memory aid for the children.*

**Is there anything you think we could have done better?**

Quite a few teachers did not answer this question while others just put 'No'. Those that did chose to comment on areas to improve often acknowledged these things could not be done due to time or staffing constraints. One did mention that particular children could have been pushed further in their use of vocabulary for example but this can be difficult to do when trying to keep the whole group interested.

- *No – it was just pitched perfectly. We all really enjoyed it.*
- *No, it was excellent.*
- *No. I think the presentation was excellent and the children were excited and motivated.*
- *No it was really good – although children were sat down for 45 minutes which is a long time but because they were engaged it was not too much of a problem.*
- *Maybe 2 people to enable more children taking part – hard to do I know.*

<b>How would you rate the science show?</b>					
	<b>Excellent</b>	<b>Very good</b>	<b>Average/OK</b>	<b>Not very good</b>	<b>Poor</b>
Presentation	61%	39%			
Content	62%	38%			
Relevance to NC	49%	47%	4%		
Length	48%	52%			
Enjoyment	90%	10%			
<p><b>Any comments?</b>            Teachers tended to use this section of the evaluation form to generally comment on what they thought about the science show.</p> <ul style="list-style-type: none"> <li><i>Excellent interaction with the KS1 class. Brought science 'to life' for my class. Children thoroughly enjoyed the presentation.</i></li> <li><i>Best classroom demo this year. Thank you.</i></li> <li><i>The children enjoyed the presentation very much, thank you.</i></li> <li><i>Really enjoyed the show, the presenter was very good with the children. Right balance of information and activities.</i></li> <li><i>It is always good to have an understanding of the properties of water, regardless of curriculum. I also really liked the water saving game - very relevant!</i></li> </ul>					
			<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
<b>Have you visited our science museum/centre before?</b>			29%	71%	
<b>Has your school visited our science museum/centre before?</b>			32%	43%	25%
<p><b>What would enable you to visit with your class in the future?</b>            The majority of the answers given here related to reduced costs, often referring to transport, and to having information about what we actually offer at the museum. While unable to provide free transport we are currently creating a new group visit information pack which will be distributed to all the schools who have taken part in the project once it is completed.</p> <ul style="list-style-type: none"> <li><i>Relevance to topic. Cost.</i></li> <li><i>If time/money/curriculum gave to it.</i></li> <li><i>Appropriate curriculum content and cost of trip.</i></li> <li><i>More details, info.</i></li> <li><i>Relevance to what we are learning and appropriate costs.</i></li> <li><i>Help with transport costs!</i></li> </ul>					
			<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
<b>Has the science show made you think about new ways to teach science?</b>			84%	9%	7%
<b>Would you have us back again?</b>			100%		

**Anything else you would like to tell us?**

- *Thank you for a very enjoyable and informative afternoon. The children were able to tell me lots of things they had learned/remembered. It really helped and inspired me (as their science teacher) to think of different ways to present things. E.g. Songs.*

**Ryedale Folk Museum – Fantastic Forces!**  
**Northern Outreach Evaluation Summary Sheet**

<b>How many days delivering outreach?</b>	15	<b>How many children saw the shows?</b>	857
<b>Number of completed evaluation sheets:</b>	Children	329	Teachers 13
<b>CHILDREN'S RESPONSES</b>			
<b>Number of children per age (years):</b>			
<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
2	0	7	62
<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>
73	65	102	17
<b>Blank</b>	1		
Best describes how much you enjoyed the science show	76.5%	23%	0.5%
The things I learnt today were ...	76%	22%	2%
	(Interesting)	(Okay)	(Boring)
The science show was ...	70%	27%	3%
	(Easy to understand)	(Okay)	(Hard to understand)
<b>What amazed you most about the science show?</b>			
<ul style="list-style-type: none"> <li>- Finding Ted: 2%</li> <li>- Tug of war: 1%</li> <li>- Galileo Demo: 9%</li> <li>- Tin Trick: 25%</li> <li>- Planets: 2%</li> <li>- Cereal: 2%</li> <li>- Parachute: 10%</li> <li>- Friction Ramp: 6%</li> <li>- Quiz: 0%</li> <li>- Rocket: 40%</li> <li>- Everything!: 3%</li> </ul>			
<b>Anything else you'd like to tell us?</b>			
<p>Most children chose to describe or draw another favourite part of the show in this section but some did comment on how much they'd enjoyed the show in general. A selection of their comments are given below.</p> <ul style="list-style-type: none"> <li>• <i>I want to see it again.</i></li> <li>• <i>I thought that it was very interesting and I learnt a lot. I thought it was a bit funny.</i></li> </ul>			



*Thank you for letting us come.*

- *It was good that you had lots of times that volunteers could go up and help.*
- *I liked the rocket best, it was fab and amazing. You were the best ever.*
- *I think that this show is an extremely good idea and that all the schools in the country should learn and listen to the important facts being told in this show but still enjoy it and have fun.*
- *It was really good because it was fun to see. It is more easy to understand when it has things to show us.*

## TEACHER RESPONSES

### What did you like about the science show?

The teachers responses in this section focused on a variety of points. They liked the science show style and use of volunteers for the different demonstrations. Many enjoyed the way the children were engaged throughout the show and the way the information was presented.

A selection of their comments are given below.

- *very practical, interesting and aimed well at children.*
- *Lots of key information covered including important vocabulary giving the children the children practical demonstrations of each concept.*
- *I liked the workshop style and the fact it was interactive and had the children involved.*
- *It was engaging and interactive – the children loved the space teddy and the rockets at the end.*
- *The enthusiasm it brings to the children for their interest in science. Clear explanation of the facts.*

### Is there anything you think we could have done better?

While quite a few teachers did not answer this question or just put 'No', many of those that did chose to comment asked for more use of volunteers during the show. Though making a valid point, this response was initially unexpected as the forces show uses just as many volunteers as the water one and no teachers commented on this during that evaluation. Others suggested that small group work would have been beneficial and while possible it would have greatly changed the science show format. The accompanying teachers pack tried to combat this by suggesting follow up activities for in the classroom.

- *No, I felt it was at the right level of interest and knowledge for the age group (9-11).*
- *No – it was engaging and well organised. Emma was well prepared and knowledgeable.*
- *Make it more child interactive.*
- *Maybe had some small group work where they could try the activities out. Difficult, but more hands on so they could try them out would have been good.*

### How would you rate the science show?

	Excellent	Very good	Average/OK	Not very good	Poor

Presentation	23%	69%	8%		
Content	40%	52%	8%		
Relevance to NC	47%	53%			
Length	31%	61%	8%		
Enjoyment	38%	54%	8%		

**Any comments?**

Not many teachers chose to comment here but those that did either commented how much they'd enjoyed the show or suggested a further improvement.

- *As always a really interesting and enjoyable experience.*
- *Teddy bear astronaut really good, maybe a worksheet the children could actively fill in either afterwards or during the show.*

	Yes	No	Don't Know
<b>Have you visited our science museum/centre before?</b>	23%	77%	
<b>Has your school visited our science museum/centre before?</b>	44%	40%	16%

**What would enable you to visit with your class in the future?**

This section of the evaluation report reinforced what we discovered during the water show, that transport costs and information on what we provide are both extremely important factors.

- *Cost of transport/entrance – it gets expensive!*
- *Information of courses/presentations on offer. Transport?*
- *Funding, the difficulty of transporting children and the paperwork.*
- *A free bus!*
- *Anything relevant to subject/topic work in school.*

	Yes	No	Don't Know
<b>Has the science show made you think about new ways to teach science?</b>	62%	38%	
<b>Would you have us back again?</b>	100%		

**Anything else you would like to tell us?**

- *More of the same please!*
- *Hope to see you soon. Thanks very much.*
- *Thanks you! It was a practical and informative introduction to Forces.*

# Science Centre Enrichment Activities Grants Project Management Final Report

Simon Chambers, SCEAG Project manager  
24 March 2008

*'It was funny and an interesting way of learning,  
not like lessons because you can join in'*

*KS2 student after the 'Feel the Force' show,  
Northern Outreach project.*

## **Consortia project management background and overview**

The grant award scheme began before Christmas 2006 with an initial pre-application briefing to potential consortia by Ecsite-uk. Submissions were invited for mid-January.

All 14 applications received were distributed to the assessment panel along with a weighted scoring system. The panel's scores were returned to the project manager and collated. A meeting of the assessment panel then selected the two highest scoring applications (>80%) as receiving an award and rejected the lowest scoring eight applications (<65%). The panel then reviewed the remaining four applications to select the final three.

The total value of the five selected projects was greater than the maximum award value of £650,000. The five recipients were then asked to find an 8% saving within their project to bring the total value of the five under £650,000.

For the sake of simplicity the project manager communicated with the principle applicant (PA) of each consortium and the PA then communicated with the other partners as necessary.

As summary reports were received from the consortia these were collated by the project manager and periodic reports sent to the funders outlining progress across all projects.

## **Claim assessment and scrutiny**

The five projects received their grant award letters in February 2007 and began work. Grant reporting requirements were drawn up and procurement thresholds established.

Four grant claims were planned for the consortia projects – March 07, July 07, November 07 and March 08. These corresponded to the draw down of the grant award from DCFS/DIUS (formerly DfES/OSI) and to ensure the project did not incur a deficit. All claims were received and assessed by the project manager. Cost detail was scrutinised and any additional information requested for clarification. Copies of invoices for any single expenditure over £500 were to be supplied and any single expenditure over £2,500 was to be procured via at least three quotations and a procurement report included in the grant claim report.

Once assessment was complete the project manager gave project management approval for payment to the Director of Ecsite-uk. The project manager had no signatory authority, only Ecsite-uk's Director could authorise invoices for payment. Claim Approvals passed to the Chair of Ecsite-uk from January to September 2007 whilst Ecsite-uk had no director (and until Dr Penny Fidler took up the post in September 2007).

All hardcopy and electronic copies of the consortia grant claims are filed in the Ecsite-uk office and are available for review and audit as necessary.

#### Concessions or compromises

The project was to implement and follow a PRINCE2 project methodology. While the principles were applied by the project manager the imposition of the reporting structure was not passed on to the consortia projects. It was felt that the reporting and grant claims, while showing due diligence to procurement and financial reporting, should be delivered by the projects with minimal impact on staff time. A reporting structure was devised and circulated that was then followed by each consortium for their progress reporting and grant claims.

### **Lessons Learned**

#### Summary

The consortia projects ran well with few problems. First grant claim payments were delayed slightly until the correct reporting format was followed and the correct documentation was supplied by the projects; thereafter there were no problems with claims reviews or payments for the Projects.

Claims relating to the Benchmarking element of the grant were delayed whilst the new director discussed and agreed the nature of the deliverables and timeframe with DIUS and DCSF.

Without a preferred reporting structure being given by the funders, Ecsite-uk devised a system that would provide the information necessary for progress reporting. A defined set of reporting guidelines provided as part of the grant award would have assisted the reporting and claiming process for the consortia and ensured that any future audit of project finances would be as straight forward as possible.

Each consortium claim was composed of:

- An attestation Letter
- Invoice for the claimed amount
- Invoice log of project expenditure
- Programme update including % complete to date
- Progress report; a narrative of work done, progress, achievements etc.
- Procurement reports for single items over £2,500
- Copy of invoices for single purchases over £500
- Marketing and education materials generated as part of the project
- Pictures of the activities being delivered

### **Assessment of project planning, delivery and other techniques used**

PRINCE2 (P2) provides a series of templates, techniques and controls for monitoring reporting and controlling projects and these were used by the project manager.

Primarily this involved gathering progress reporting from the projects and reporting to the project executive, Ecsite-uk's Chair (Before September 2007) and Director (after September 2007) and then the funders.

P2 provided adequate methods to produce all the reporting and to control, as necessary, all aspects of the consortia projects.

### **Analysis of Project Issues**

Only one major issue relating to the projects emerged during the project. One consortium needed to make a payment on ordering equipment. As the equipment constituted a significant proportion of the project expenditure the partners were not able to fund this cash flow.

A pro-invoice for the order was received from the supplier and presented in an interim claim by the consortium. This claim was paid outside of the established claim schedule with no adverse effect on the project budget and cash flow.

The other issue related to the nature of the Benchmarking element of the project and was resolved through close collaboration between the new Ecsite-uk Director and the DIUS/DCSF team.

### Recommendations for Future Enhancements

Ecsite-uk now has an established, large project financial reporting and claim format that should be used on future projects.

A defined project manager/administrator role is necessary to handle queries for the grant recipients, report to the funders and administer the claim process, providing due diligence over grant claims.

**Follow-on Actions**

- Ensure project documentation, hardcopy and electronic, is archived and available for review and audit as necessary.
- Lessons Learned report circulated within Ecsite-uk to inform other projects.
- Monitor new activity by consortium projects to record impact of grant awards going forward; bookings for shows, schools visits and other activities such as CPD.

**Handover Plan**

The project will be concluded and all documentation and reports handed over to Ecsite-uk. Filing and archiving to be carried out by Ecsite-uk.

## **Acknowledgements**

Ecsite-uk would like to acknowledge the work of the hundreds of teachers and thousands of pupils who have taken part in this project.

We would also like to thank staff at the following Science & Discovery Centres and Museums for their dedication and enthusiasm throughout this project.

- At-Bristol
- INTECH
- Porthcurno Telegraph Museum
- Thinktank
- Inspire
- TECHINQUEST@NEWI
- Science Oxford
- Techniquist
- The Science Museum
- The Observatory Science Centre
- Centre for Life
- Eureka!
- MOSI
- Ryedale Folk Museum

Finally we would like to thank DIUS and DCSF who have, through funding this project, enabled a number of UK Science & Discovery Centres to reach new audiences such as children in hard-to-reach schools and teachers in remote areas, to develop new ideas, resources and best practices as well as strengthening partnerships between UK centres that will have benefits long into the future.