THINK PHYSICS INTERIM REPORT

September 2015

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1 Executive Summary

Think Physics engages and inspires young people and their support networks in science. It draws and builds on research and practice from previous outreach, widening participation and gender projects in the physics and STEM/SIV areas. The project aims to increase the uptake of physics and related disciplines, with a particular focus on increasing science capital among female and other under-represented groups. Led by Northumbria University, Think Physics works across all age ranges from early years to post-16 and works in partnership with industry, and with science and education trusts and bodies.

The project has a dedicated team and a physical presence comprising an open lab, computing area and soft seating located in the centre of the academic science and engineering community at Northumbria University. It has also developed an engaging and lively website thinkphysics.org which complements the face to face activities and supports engagement.

During the first year of operation, Think Physics has worked intensively with 15 partner schools, and more loosely with a number of non-partner (linked) schools, reaching 9901 young people, 447 teachers, 818 parents and carers and 1277 members of the wider community. Further highlights include work in primary schools to increase science capital among young people and build the confidence of primary teachers – themselves often from non-science backgrounds – in engaging with science and potential careers. Partnerships with industry have been valued by employers as the project provides a much needed bridge between industry and the education sector. Collaborations have led to the development of career case studies and career oriented curriculum related resources, much valued by schools and teachers. The project has positively engaged with 'hard to reach' communities through a variety of mechanisms including the use of science pop-up shops and art exhibitions inspired by scientific research. Where possible, Think Physics works in partnership with existing STEM initiatives and events to complement them and add further value.

The project has collected baseline data which highlight challenges facing the region: a number of schools have very poor participation rates in AS and A-level physics, and the North-East as a whole shows a particularly high drop-out rate from AS to A-level compared to other subjects, and to the national picture for both female and male students.

In 2013/14 the national figures for progression from AS to A-level were 57% for girls and 71% for boys: the figures in Think Physics' partner schools were 27% for girls and 46% for boys. However, these figures also show that once a young person completes A level physics they are highly likely to progress into higher education (86% for Cohort 1 schools) and study a physics or related degree (49% for Cohort 1 schools). These figures clearly demonstrate the need for interventions (such as Think Physics) to increase the engagement and uptake of physics and science at A Level and beyond, with a focus on females and other under-represented groups.

The project aims to increase science capital in the region and is developing research methods and tools to evaluate this among young people at all stages of their education. Both results and tools are likely to be of interest to the wider research and education sector, providing a strong basis for evaluating the success of Think Physics and other studies.

As the project moves into its second year, the team are increasing the number of partner schools to thirty, whilst refining and expanding the activities and engagements provided. They're both strengthening the engagement and increasing the reach of the project.

2 Introduction and Ethos

'*Think Physics*' builds upon the results of previous outreach, widening participation and gender projects in the physics and STEM/SIV areas and bring them together holistically to create a strong supportive sustainable system that inspires, engages and helps school children through their journey into physics with a particular focus on increasing the uptake of physics and related disciplines by females[1]. The project is led by Northumbria University in partnership with North Tyneside, Durham, Gateshead, and Newcastle local authorities, North Tyneside Learning Trust, Institute of Physics, Engineering Development Trust, Solar Capture Technologies, Kielder Observatory and the International Centre for Life.

[1] Think Physics Long Business Plan November 2013

2.1 Project Objectives

The key objectives of this project[2] are:

i. To address the gender imbalance in the Strategically Important and Vulnerable Subject (SIVS) of physics thereby improving the sustainability of the subject during a period of demographic decline in the 18-20 year old population.
ii. To provide a higher education (HE) partner in the North East that enables the professional body, the Institute of Physics (IoP), to complete a national network of universities promoting the subject and related disciplines.
iii. To create capacity in the North East that addresses the widening participation agenda across the physics and related disciplines.
iv. To develop a set of holistic interventions in the school life cycle and a partnership working approach that relates to Objectives (I) – (III) and provides a blueprint that is transferable and applicable across England.

2.2 Vision and Aims

During the first year, the objectives have been used to develop the following vision and aims for the project:

Think Physics **Vision:**

- To create a holistic widening participation and gender equality scheme based on partnership working that will lead to greater uptake of physics and related disciplines by children, and particularly girls, in the North East region.
- To build science capital in the North East region
- To provide a blueprint for a regional scheme that can be shared with others and a sustainable scheme for the North East.

Think Physics **aims to:**

- INSPIRE young people to choose science and think physics at A-level
- ENLIGHTEN parents and carers that STEM can open doors for young people
- SUPPORT teachers to deliver physics and the wider STEM curriculum
- ENCOURAGE uptake of physics-related subjects at higher-level, both academic and vocational.
- FOSTER PARTNERSHIP among education, business and public sector in the region
- DEVELOP and disseminate a sustainable model which reflects best practice in science engagement.

2.3 Approaches to i-Think Physics and Physics4All

ASPIRES[3] defines 'Science capital' as:

"science-related qualifications, understanding, knowledge (about science and 'how it works'), interest and social contacts (e.g. knowing someone who works in a science-related job)." Pg3. ASPIRES (2013)

Think Physics is working with young people and their support network to help increase their science capital, particularly among females. This has led to the following principles:

- ***Sustained Engagement:*** the aim of the project is to interact with young people from our partner schools and the wider North East region on an ongoing basis rather than as 'one off' activities.
- ***Gender Inclusive:*** the project works with a number of different groups of young people to ensure a gender inclusive approach. When working with whole class, school and public events it is not possible to select the gender mix. However for other activities, the project provides some female-only activities enabling girls to work together and support each other. Think Physics also offers mixed group activities and ensures wherever possible that these comprise equal numbers of males and females.
- ***Career Inspired:*** resources, workshops and talks offered by the project for young people and their wider support network are career inspired and within the school environment, this is linked to the curriculum. This ensures that young people are made aware of the pathways that science can lead to both in the context of their school science education and wider interests.
- ***Targeting 'hard to reach' communities:*** the project uses a number of different approaches to take science out into the community, to those that would not normally engage with science. These have included 'science pop-up shops' and linking with the 'creative arts' sector to deliver joint productions and exhibitions.

[2] Think Physics Proposal Summary Document November 2013
[3] https://www.kcl.ac.uk/sspp/departments/education/research/aspires/ASPIRES-final-report-December-2013.pdf

3 Data: Reach, A Level and Undergraduate

This section provides the position for the partner schools and wider community within the project as outlined by HEFCE[4] along with the progress towards the success criteria. Cohort 1 schools are the schools that Think Physics worked with during the first year of the project and Cohort 2 are the additional schools who have been invited (not all primary schools are confirmed) to work with the project in years 2 and 3 of the project. Appendix 1 (pg. 19) lists the partner schools for cohorts 1 and 2.

3.1 Extensive reach of project interventions

Data on the extensive reach of the project includes data collected from partner schools, link schools and the wider community that the project has engaged with.

Link Schools: In addition to partner schools, the project has also been contacted by a number of other primary and secondary schools from across the region. These are being called 'linked' schools and are being offered a smaller package of support compared to the partner schools.

Key Influencers: As part of the wider reach of the project, the number of 'key influencers' that have taken part in project activities has been collected. Key influencers include teachers, parents, carers and wider community members.

For data protection reasons, and to simplify procedures, pupil level data such as name, date of birth and postcodes has not been collected. However, data on each school and each class visited are collected. These data can be interrogated to estimate what proportion of the school population has taken part in the project, and how often.

Box 1 summarises the reach of the project at the end of the first year of the project for partner schools, linked schools and for the Think Physics 4All strand of the project, and details for each strand is given in Appendix 2 (pg. 20 – 21).

***Box 1*: Success criteria 1: Extensive reach of project interventions across partner schools at pre-school, primary and secondary level.**

Measures

Work with minimum 20 schools by end of project year two, and 30 schools by end of project year three.
Year Two 2015-16:
Pre-school – 600 (total) - 300 (10 x 30) in pre-school education and further 300 through city wide/community/regional events
Primary – 2000 (10 x 200)
Secondary – 12000 (12 x 1000)

Current Numbers:

Number of Schools reached	
Year One (Primary: 8 Secondary: 7)	15 partner schools
Number of Young People reached	
Preschool Total Number	601
Primary Total Number (Partner Schools: 1863 Linked Schools: 360)	2163
Secondary Total Number (Partner Schools: 3010 Linked Schools: 1073)	4083
Community Events	3054
Total Number of Young People	**9901**
Number of Key Influencers reached	
Teachers	447
Parents/Carers	818
Wider Community	1277
Total Number of Key Influencers	**2542**

[4] Letter from HEFCE to Northumbria dated 05 August 2015

3.2 Data for the number of pupils, including girls and pupils from low participation neighbourhoods, studying A-level Physics

3.2.1 A-level Physics

The baseline data, and data for academic year 2014-15, for the number of pupils studying A-level Physics at Cohort 1 and 2 schools is summarised in *Table 1*. Low participation neighbourhoods were identified using Income deprivation affecting children Index (IDACI) rank. Students with an IDACI value in the lowest 20% were considered to be from low participation neighbourhoods. Cohort 2 schools have only just been recruited to the project and the data for 2014-15 is not yet available from the schools.

Appendix 3 (pg.22 – 24) provides the year-on-year data for the number of pupils studying AS and A-level Physics in partner schools from which the baseline data was calculated. No school had an obvious increasing or decreasing trend in the number of pupils, and varied from year to year. To take into account this variation, the baseline data is an average of the number of pupils studying in each school calculated over three academic years. Appendix 4 (pg. 25) provides the number of pupils who took AS and A2 in Summer 2015 for Cohort 1 partner schools.

	Number of pupils studying A-Level Physics		**Number of female pupils studying A-Level Physics**		**Number of pupils from low participation neighbourhoods studying A- Level Physics**	
	Baseline for 2010-13	**2014-15**	**Baseline for 2010-13**	**2014-15**	**Baseline for 2010-13**	**2014-15**
Cohort 1	41	50	8	Data not yet available	14	Data not yet available
Cohort 2	40	Data not yet available	6	Data not yet available	13	Data not yet available
Total	81		34 (21%)		27 (17%)	

Table 1. Number of pupils studying A-level physics in partner schools.

3.2.2 Progress towards success criteria

Box 2 provides a summary of the progress towards increasing the number of young people studying A-level Physics in partner schools. The data for females and students from low participation neighbourhoods are not yet available, and this measure will be obtained once the validated NPD database has been made available.

Box 2:		
Success criteria 2 **Increased number of North East school pupils studying A-level physics in partner schools**	**Measures** 2017-2018 Increase of 185 against baseline	**Baseline A-level physics** Cohort 1 41 students **Number in 2014/15** Cohort 1 50 students
Success criteria 3 **Increased number of female school pupils studying A-level physics in partner schools**	10% annual increase from end of AY 2015-16 of a school's involvement with Think Physics programme.	Data not yet available
Success criteria 4 **Increased number of children from low participation neighbourhoods choosing to study A-level physics in partner schools**	10% annual increase from end of AY 2015-16 of a school's involvement with Think Physics programme.	Data not yet available

For this interim report, the HEFCE letter of 5th August suggested that the aim should be for an increase of 40 students against the baseline. It can be seen that, from the current data, there has been an increase of 9 students compared to the baseline.

Across Cohort 1 and 2 schools, the baseline number of those studying A-level Physics was 79 pupils (Appendix 3.1, pg. 22). An increase of 185 on this baseline at the end of the project would represent a more than doubling of the number of students completing a physics course. Given the low rates of progression from AS to A2, this would require an even greater increase in the number of students who study AS physics.

For Cohort 1 and 2 schools the number of female pupils starting to study AS physics (Appendix 3.2, pg. 23) ranges from 10 to 0 and the number of female pupils that complete A-level Physics ranges from 5 to 0. For every partner school, a 10% annual increase would be a fractional person.

The baseline data for Cohort 1 and 2 schools (Appendix 3.3, pg. 24) also shows that for many partner schools, only one student from a low participation neighbourhood completes A-level Physics each year.

In choosing Cohort 2 partner schools the percentage of pupils who receive pupil premium has been taken into consideration. This is taken as a measure of disadvantage, and whilst it does not directly provide information on the participation levels of a family, it can be used as a proxy measure as there is a correlation between them. It is also likely that a pupil who is eligible for pupil premium will possess a low IDACI (Income deprivation affecting children Index) rank, placing them into our low participation category. It is therefore likely that we will be interacting with more pupils from a low participation neighbourhood, and influencing them to aspire to university.

3.3 Data for the number of pupils, including girls and pupils from low participation neighbourhoods, progressing to physics related degrees

3.3.1 Comparison of baseline and 2014-15 data

A linked data extract from NPD and HESA has been used to obtain a baseline for progression to higher education. Recognising that some students may take a gap year, pupils who studied A-level physics in partner schools were tracked for the following three academic years (where data allowed) to identify if they progressed to a higher education course, and if so, the subject studied. Appendix 5 (pg.26 – 29) shows the baseline data for three academic years (2010-13) for partner schools

Anecdotal evidence suggests that students who study A-level Physics often go on to higher education, with many taking STEM degrees. This is the case for Think Physics partner schools (Appendix 5.1, pg. 26), showing that once a student has progressed from AS to A2 they will generally then continue studying as an undergraduate.

Table 2 below gives the averaged baseline data, and the data for Summer 2015, for young people progressing to physics and physics related undergraduate courses in partner schools. The data for Cohort 1 schools given in Appendix 5.3 (pg. 29) from 2015 are self-reported and does not include any students who may be taking a gap-year.

	Number of all pupils progressing to study physics and related undergraduate programmes across the UK		**Average number of female pupils progressing to study physics and related undergraduate programmes across the UK**		**Average number of pupils from low participation backgrounds progressing to study physics and related undergraduate programmes across the UK**	
	Baseline 2010-13	2014-15 data	Baseline 2010-13	2014-15 data	Baseline 2010-13	2014-15 data
Cohort 1	22	25	2	Data not yet available	6	Data not yet available
Cohort 2	23	Data not yet available	1	Data not yet available	2	Data not yet available
All partner schools	**55**		**3**		**8**	

Table 2: Partner school progression to physics or related degrees in the UK averaged over three academic years (2010-2013) compared with 2014-15 data

3.3.2 Progression towards success criteria

Box 4 provides a summary of the progress towards increasing the number of young people studying A-level Physics in partner schools who progress to higher education. The data to measure the increase in the number of girls and students from low participation neighbourhoods who progress to physics and related undergraduate programmes across the UK are not yet available. The data to for 2014-15 are also not yet available, and will be obtained from a NPD-HESA database extract request in the next academic year.

Box 4:		
Success criteria 5 **Increased number of school pupils from the North East progressing to studying physics and related undergraduate programmes across the UK.**	**Measures** 2017-18 Increase of 93 against the baseline.	Baseline progression to University Cohort 1 schools: 22 students 2014-15: 25 students
Success criteria 6 **Increased number of female school pupils from the North East progressing to study physics and related undergraduate programmes across the UK**	**Measures** 10% annual increase from end of AY 2015-16 of a school's involvement with Think Physics programme.	Data not yet available
Success criteria 7 **Increased number of children from low participation neighbourhoods progressing to study physics and related undergraduate programmes across the UK**	**Measures** 10% annual increase from end of AY 2015-16 of a school's involvement with Think Physics programme.	Data not yet available

For this interim report, the HEFCE letter of 5th August suggested that the aim should be for an increase of 20 students against the baseline for this success criteria. It can be seen that, from the current data, there has been an increase of 3 students for 2014-15. One school has not yet provided this information and so the final figure will be slightly higher.

Across Cohort 1 and 2 schools the baseline number of students progressing to a physics or physics-related degree was 55 pupils (*Table 2*). An increase of 93 by academic year 2017-18 would represent a large number of students progressing to university to study physics or a physics related degree.

Looking at the baseline data for Cohort 1 and 2 schools for the number of female pupils progression to physics and related undergraduate courses (Appendix 5.2, pg. 27) no school has more than 1 girl progress to these courses, and many schools have none. The data also shows that, for many partner schools, on average only one student from a low participation neighbourhood progresses to a physics or related undergraduate degree each year. This progression appears to be poorer in cohort 2 schools than in cohort 1 schools.

3.4 Data for number of pupils, including girls and pupils from low participation neighbourhoods studying Physics AS and A Levels

3.4.1 Progression from AS to A-level Physics

Think Physics has captured baseline data on the number of students starting physics in Year 12 (AS Level Physics) and those continuing on to A Level Physics in Year 13. This data is provided in *Table 3* and is included because it shows that there is a higher than expected drop off in the numbers of young people progressing from AS to A Level Physics, when compared to the national picture and when compared to other subjects.

The data for AS and A-level allows a comparison of the number of students who start studying physics in Year 12 with those who complete the two year course in Year 13. Ofsted recently published details on the AS to A-level progression rates for a variety of subjects, including physics[5] for those pupils who complete their Key Stage 5 studies in 2013/14. Table 2 shows the progression to A-level across cohort 1 and 2 partner schools by comparing the number of pupils starting AS physics in 2012/13 with the number of pupils completing A-level physics in 2013/14.

Progression to A level	**Girls**	**Boys**
Partner schools average (2011/12)	35 %	60%
Partner schools average (2012/13)	31%	64%
Partner schools average (2013/14)	27%	46%
National average (2013/14)	57%	71%

Table 3: Percentage of girls and boys who continued from AS to A2 Physics.

It can be seen that the 2013/14 progression rate from AS to A2 for all pupils is much lower for in partner schools when compared with the data for the national average for 2013/14. The data for previous years is higher (particularly for boys), but still below the national average.

3.5 Commentary on Reach, A Level and Undergraduate Baseline Data

The data on reach of project interventions shows the project is on target to reach across all ages ranges of young people and is also reaching their key influencers through both strands of the project: i-Think Physics and Physics4All.

The data on number of young people, females and those from low participation neighbourhoods studying A Level physics show that the actual numbers in partner schools are significantly lower than those predicted in the original bid. Working with the four local authorities and North Tyneside Learning Trust, Think Physics has targeted schools where physics participation is viewed as a challenge and this has led to low overall baseline numbers. Think Physics originally targeted a number of schools with greater numbers of students studying A-level Physics but they declined to take part in the project citing two main reasons: already feeling they were doing well with physics; and quoting staffing capacity issues if they grew physics further. Furthermore the impact from changes in the A Level curriculum remains difficult to predict and there is some anecdotal evidence that a number of schools have stopped AS Levels and are limiting students in Year 12 to 3 A Level choices. Given the low progression rates from AS to A2, the concern is that students will not start on an A-level Physics course. These issues were raised earlier in the year with HEFCE and it was agreed that the baseline numbers would be presented in this report, with appropriate success measures agreed for subsequent years based on an increase of 10% relative to the national and regional contexts. This will be done using the national data published by the Joint Qualifications Council and the NPD database using matched schools and regional data.

4 Success Measure: Science capital

During this first year, Think Physics has proposed the addition of a further qualitative success measure based on science capital. The work of the ASPIRES team at Kings College, London, has highlighted the importance of science capital in influencing young people to study science. This additional measure would allow the project to robustly measure the success of the extensive work being undertaken with young people and teachers in the primary partner schools and complement the measures at A Level and beyond. It also adds richness to the research data and provides a longitudinal measure which fits with the holistic nature of the project and working with young people from early years to sixth form and beyond.

Think Physics proposes to capture the science capital among a sample of young people in the primary and secondary partner schools and evaluate how this science capital changes as the project progresses. Although there are well tested tools to evaluate science capital at secondary school, there has been less work on this with primary and preschool. Think Physics has developed

[5] https://www.gov.uk/government/publications/a-level-subject-take-up

tools to evaluate science capital among primary school children and this approach should be of interest to the wider education research community and form an important outcome of the research strand of this project.

Appendix 6 (pg. 30 – 31) contains an outline of the research plan for the qualitative aspects of the project monitoring.

5 Progress against milestones

5.1 Staffing, Space and Schools

The full Think Physics team were recruited and in place by October 2014. Three members of staff were in post from July 2014 allowing initial preparation to take place for the first full academic year 2014-2015. As part of Northumbria University's support for the project, an open plan lab, computer workspace and soft seating area, Think Lab was created for co-use by the Think Physics project, academic staff and students. This multi-purpose space was created for the start of academic year 2014-2015 and has proved very successful in introducing young people to university life in an engaging and safe environment. When pupils visit the Think Lab, there are often students and academic staff working in other parts of the space and this co-location helps break down any barriers around higher education. Think Lab is in the centre of the Faculty's accommodation, adjacent to the Think Physics staff office, an academic office and university physics laboratory ensuring that it and the work of the team are fully integrated into the academic world.

The initial cohort of partner schools from the project were recruited with support from the four local authorities and North Tyneside Learning Trust. The team ensured that there was senior management agreement to the project as well as agreement from the science teaching team. By October 2014, there were 15 partner schools: 7 secondary, 6 primary schools, 1 first school and 1 middle school. In several cases the primary schools were 'feeder' schools to the secondary and this has proved useful and has been a model adopted for the recruitment of cohort 2 partner schools. For each school, the Think Physics team have worked with the school to identify what STEM activities are already taking place and to create a plan of activities for the first year of the project. The primary schools have been enthusiastic and engaged well. It has been more difficult at times to reach the key people in the secondary schools and find sufficient time to enable full participation in the project.

Think Physics partners have been closely involved throughout in supporting the work and activities of the project. They provide a range of support from staff time to access to resources and facilities. All the initial partners are represented on the regional management meeting with a smaller representation at the advisory board. Industry partners have provided case studies and support on specific events. Other partners such as Kielder Observatory and International Centre for Life have supported school visits and activities and other events such as Maker Faire. Partners such as the Institute of Physics and the trusts have offered advice on effective approaches and worked with us to provide a coordinated approach to events and workshops.

The management and governance of the project through the use of the regional management and project advisory boards is working well and ensures there is good communication across partners (regional management group) and independent scrutiny and advice (project advisory board). These bodies report to the main business and engagement university committees and through this to Academic board and the governing body ensuring the project continues to support the vision and ethos of the university.

5.2 Employer Engagement

Think Physics works closely with employers from across the region and nationally. This includes developing individual case studies of employees, examples of businesses and the types of people they are looking to employ. This work will be part of the digital presence of the project, and will link young people and their key influencers with employers. The Think Physics website will also provide a database of opportunities for young people and resources to support teachers to embed career messages within their curriculum based lessons. We are also supporting employers to engage with young people. This engagement includes planning events together (e.g. Big Bang NE), providing an employer participation at Think Physics hosted events (e.g. Physics in Perspective), and supporting employers to develop their engagement plans with schools (e.g. Show and Play boxes)

5.3 Website and Social Media Reach

An integral part of the Think Physics project is the digital presence. A website www.thinkphysics.org was created early in the first year and this has been used to disseminate our activities and ethos through blogs, to support classroom teachers with ideas for teaching, and to provide a record of each partner schools interaction with the project. *Figure 1* shows the website views for the project from the launch of the website in November 2014.

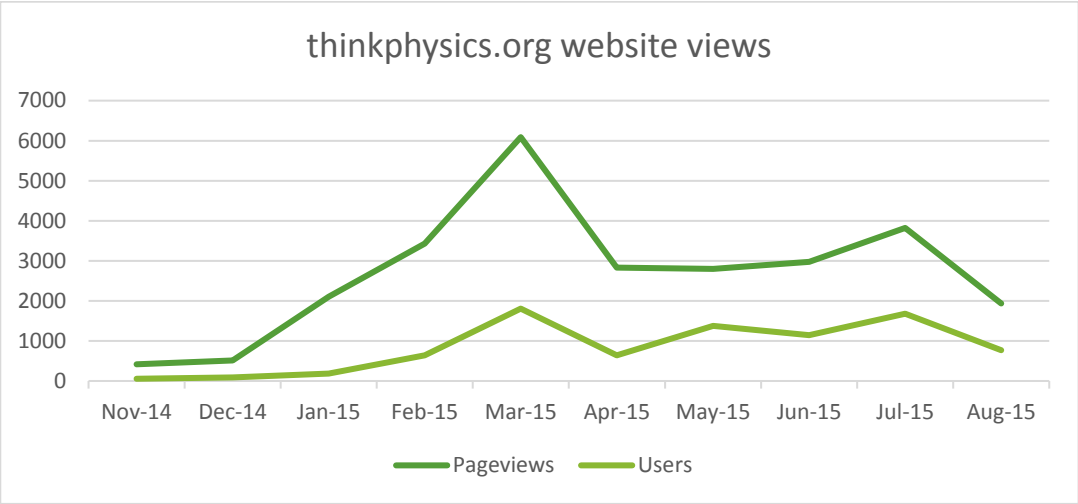

Figure 1: Website usage for the first year of Think Physics Website

The peak in the data in March 2015 is related to the Partial Solar Eclipse where Think Physics hosted an event on the university campus and provided online resources for use in schools[6]. These proved very popular and although much of the traffic in March was transitory, the user reach has remained quite steady.

Many of the page views and audience are concentrated in the North East, suggesting good local reach. About 1/3 of visits are by returning visitors: these people view more pages (3.62 vs 1.73) in longer sessions (5:15 min vs 1:04 min). A number of visitors return to the site every few weeks.

Think Physics also has a Facebook[7] page and a Twitter[8] account, and these have proved useful in driving visits to the website.

5.4 Future Plans, Sustainability and Dissemination

Following a review of the project towards the end of year one, the decision was made to recruit and work with the full complement of 30 schools from year 2 onwards, rather than a staged recruitment over three years as suggested in the initial project bid. It was felt that this would lead to a more embedded partnership and greater reach within these schools and also allow both sides to identify and deal with any constraints that might impact on successful engagement. To date, 7 additional secondary schools have agreed to become partner schools with 2 more considering the offer. Feeder primary schools for each of these secondary schools have also been approached and discussions are ongoing.

Although the project is still at an early stage, a key objective is ensuring the project is sustainable in the longer term. The Think Physics project has already attracted further funding of over £100k to support the creation of a mobile 'maker lab', a Year 12 summer school and a small number of undergraduate bursaries aimed at female engineering students. It is also strengthening and embedding its connections with the wider higher education community. Academic staff are providing resources and support and the team is actively exploring the use of university students within its work, providing additional help whilst also giving the students valuable work experience and enhancing their employability.

To support its sustainability and ensure good practice is disseminated more widely, Think Physics has been invited to present at a number of national conferences aimed at education professionals (see *Table 4*). These presentations have been focussed on the ethos of the project, and also on how classroom teachers can embed this ethos within their teaching.

Date	Conference	Title of presentation
August 2014	York TU	Careers in your Classroom
September 2014	ResearchEd 14	Should we be encouraging girls into science?
January 2015	ASE annual Conference	Two presentations: Think Physics: Using physics to inspire young people On the move: Simple mechanisms
September 2015	ResearchEd 15	Gender equity in Science.

Table 4: Presentations given by Think Physics staff at National Education conferences

[6] http://thinkphysics.org/activity/solar-eclipse/
[7] https://www.facebook.com/thinkphysics.org
[8] https://twitter.com/thinkphysicsne

In addition to this Think Physics is making links and networking with other universities and organisations that have a particular interest in gender equity particularly in the STEM disciplines. These links will facilitate the dissemination of a blue print for a regional scheme.

Appendix 7 (pg. 32 – 37) provides details for the progress against milestones and an updated plan going forward.

6 Equality, Diversity and Widening Participation

6.1 Athena Swan and Project Juno

Northumbria University is committed to the Athena SWAN Charter and has set up a Self Assessment Team (SAT), which is leading on the work in this area and has recently submitted an application for an institutional Bronze Award. The Athena SWAN Self-Assessment Team is a subgroup of the University Equality and Diversity Committee and brings together members of the University Executive, Human Resources, Marketing, Finance, Research and Business Services, together with academic representative from each STEM department. Its main function is to consider sector strategies and initiatives that follow the Athena SWAN agenda and that promote the advancement of women in STEM subjects. The current activities of the SAT are aimed at informing the University Equality and Diversity Committee on strategy and policy development, strategy and policy approval, monitoring and reviewing. Think Physics is represented on this team and has also presented specifically on the project to ensure it is linked into this university initiative.

The Department of Physics and Electrical Engineering became a Juno Supporter in March 2014 having stated a commitment to the five Juno principles and to working towards Practitioner and Champion status. Since that time, the department has been assessing procedures and gathering data in order to be in a position to submit a Practitioner application. In October 2014, the University launched the NUWISE network, which aims to support and develop female staff members and PhD students in science subject areas across the University. This support network holds regular meetings regarding aspects of working and career development and also provides informal mentoring, to complement the formal University procedures. Staff and student members in the physics area engage with this network and the Juno lead for the Department, Professor Nicola Pearsall, is a member of the NUWISE committee. The Practitioner application requires data on both staff and students in terms of diversity and the Department's approach to encouraging and facilitating female participation. Since the current physics courses at Northumbria started only two years ago (academic year 2013-14), the application has been deferred until three years of application data were available. The department intends to submit for Practitioner status by April 2016.

6.2 Internal links and coherence with institutional objectives on equality and diversity and widening participation

Northumbria University is fully committed to fair access and outreach and historically has been a highly successful widening participation university. The outreach and access activity is delivered through a 'hub and spoke' model with an intensive central programme of interventions during school years combined with faculty and department specific outreach and widening participation activities and support. Think Physics links to this in a number of ways. The Faculty Director of Widening Participation and Outreach and the University Student Recruitment Manager with oversight of widening participation activity are both members of the Think Physics Regional Management Board. Think Physics has also worked with this team to support a number of widening participation initiatives including work with Looked after Young People/care leavers, providing STEM careers advice and support through the Raising Aspiration Partnership. Think Physics regularly meets and shares good practice with the widening participation faculty and university team with the aim of embedding this more fully as the project progresses.

6.3 Equality Analysis Summary

An Equality Analysis Summary has been completed and is reviewed regularly by the Think Physics Advisory and Regional Management boards. This policy considers the effects of Think Physics policies on people with respect to age, disability, gender, (including gender identity), racial equality, and low socio-economic status.

The Think Physics project is compliant with Northumbria University's Equality and Diversity Policy: https://intranet.northumbria.ac.uk/facultiesandservices/hri/guidance/azpolicy/edpolicy/. It aims to use physics to inspire young people, particularly women and under-represented groups into Science, Technology, Engineering and Mathematics (STEM) disciplines. When referring to under-represented groups, Think Physics has agreed to focus particularly on low socio-economic status. Low socio-economic status will be measured through Pupil Premium and Income Deprivation Affecting Child Indices.

The analysis finds that the project has a positive impact on sex and no impact on the other protected characteristics. Additionally

the project is likely to have a positive impact on children from low socio-economic backgrounds. *Table 5* provides a summary of the equality analysis and Appendix 8 (pg. 39 – 45) provides the full Equality Analysis Summary for all the protected groups and characteristics.

Equality Group	Negative Impact	Positive Impact	No Impact	Unknown
Age			X	
Disability			X	
Gender Reassignment			X	
Marriage and civil partnership			X	
Pregnancy and Maternity			X	
Race			X	
Religion or belief			X	
Sex		X		
Sexual Orientation			X	

Table 5 Summary of equality analysis for Think Physics

7 Supporting young people with progression to higher education

Table 6 provides a summary plan of how young people are exposed to Higher Education progression options during their interventions with the Think Physics project. This ranges from visits and events hosted at the university, providing advice and case studies on professional career routes and underpinning educational requirements to use of academics and university students across the range of project activities.

School Stage	Activities/Resources	Time Period
Pre-school	• Professional careers classroom loans boxes • Think Physics university student interns provide support to project delivery	Year round Summer
Key Stage 1	• KS1 visits to the Think Lab, Northumbria University • Professional careers classroom loans boxes • Think Physics university student interns provide support to project delivery	Year round Year round Summer
Key Stage 2	• KS2 visits to Northumbria University, Think Lab • Meet the Expert – Geologist workshops by academics in schools • Student ambassadors provide support to project delivery • Student teachers and student interns support primary summer school • Think Physics university student interns provide support to project delivery	Year round Year round Year round Summer Summer
Key Stage 3	• KS3 visits to Northumbria University, Think Lab • Student ambassadors provide support to project delivery • Year group specific careers assemblies • Think Physics university student interns provide support project delivery • Northumbria University academics deliver 5 week RI Masterclass series in Engineering for Year 8 pupils • Northumbria University hosts Big Bang North East	Year round Year round Year round Summer March July
Key Stage 4	• KS4 visits to Northumbria University, Think Lab • Year group specific careers assemblies on options and progression • Think Physics support for Year 9 Open and Options Evenings • Student ambassadors provide support to project delivery • Think Club – regular maker club at Northumbria University • Northumbria University academics deliver 5 week RI Masterclass series in Engineering for Year 11 pupils	Year round Year round Year round Year round October July

	• Northumbria University hosts Big Bang North East • Think Physics stand at North East Skills the region's biggest skills and careers event for 15-24 year olds	Sept
Key Stage 5	• KS5 visits to Northumbria University, Think Lab • Think Physics support including career advice at Year 11 Open Evenings • Year group specific assemblies on options and progression • Physics Matters – 5 week lecture series at Northumbria University delivered by academics from Northumbria and external academics • Physics in Perspective – Half day workshops for sixth-form students delivered by Northumbria and external academics as well as industry professionals • Reece Summer School – 3 week Engineering summer schools for girls hosted at Northumbria University • Think Physics stand at North East Skills – the region's biggest skills and careers event for 15-24 year olds • Case studies on professional career routes	Year round Year round Year round Oct – Nov March Jul – Aug Sept Year round

Table 6: Plan for Supporting Progression to Higher Education

8 Financial report

Funding and Spend	**Time Period**	**Total Amount (£)**
Total Income Received Year 1	*April 2014 – July 2015 (2014-2015)*	*513,280*
Total Project Spend Year 1	April 2014 – July 2015 (2014-2015)	316,222
Forecast Spend Year 2	August 2015 – July 2016 (2015-2016)	428,000
Forecast Spend Year 3	August 2016 – October 2017 (2016-2017)	432,494
Total HEFCE Funding (Years 1-3	April 2014 – October 2017 (2014 – 2017)	1,176,716

Table 7: HEFCE Funding Projected and Actual Spend

Following the award of the HEFCE Catalyst funding for Think Physics, the payment schedule for the grant was adjusted to account for the recruitment and employment of key staff with final payment due in July 2017 and final report due in October 2017.

The project forecast provided in *Table 7* demonstrates that the project spend will be on target by the end of the project. However, there has been an underspend in the first 12 months of the project. This was due to two factors. A delay in staffing during the first few months of the project as recruitment took longer than anticipated, leading to an underspend in staffing costs, which is the significant proportion of the HEFCE funding. Secondly and to a lesser extent, low levels of initial engagement from secondary schools leading to an underspend in non-staffing costs.

As stated earlier in this report, Think Physics is increasing the number of schools to 30 from year two of the project. This is earlier than anticipated but the team believes this will yield more benefits to the young people, schools and project. Furthermore the staffing costs run to October 2017 to ensure the timely completion of the project, wider dissemination and reporting. These together mean the project will be on track to spend the funding by October 2017 with the current underspend being allocated across Years 2 and 3 as shown in *Table 7*.

9 Risk Assessment

At this stage in the project, there has been no overall change to the risk status of the project as shown in Appendix 9, (pg.46). However, as has been identified in section 2 of this report, some of the original success criteria relating to number of students studying A-level physics and physics undergraduate courses are unlikely to be met. Following discussion with HEFCE, the project is also monitoring absolute numbers.

10 Key Achievements

10.1 Working with young people from 'cradle to career'

Recent research (ASPIRES(2013)[9], Holman (2014)[10], Macdonald (2014)[11]), has recommended that STEM interventions need to take place regularly from an early stage in a child's school journey in order to impact on their future career choices. Think Physics is designed to support young people from 'cradle to career' and through this build science capital with them and their support network. Primary schools have particularly valued the support from Think Physics this year. The project has worked closely with science coordinators who often do not have a science background and welcome the input from the project particularly on careers and how these relate to the science curriculum. The baseline data shows that the project has considerable reach interacting with over 10,000 people in its first year.

10.2 Partnership with industry

A key objective of Think Physics is to work in partnership with industry and business and broker ways for them to work with young people and their support network. This approach has been welcomed by industry particularly with the work with primary school partners as industry do not always know how to engage with this part of the education spectrum. One specific example has been the development of 'Show and Play' boxes for use in the Early Years and Foundation Stage. Esh Construction sponsored and worked with the Think Physics team to create a Construction box and this has been used as part of their Corporate Social Responsibility (CSR) work with schools. This approach is now being rolled out more widely across other industrial sectors. Figure 2 shows the construction box in use.

Girl measuring

Girl and boy building

Figure 2: Construction 'Show and Play' Box in Action

Each Show and Play box contains a variety of objects related to the theme, along with project books and teacher notes on their use and related career information and ideas. These increase teachers' confidence in talking about STEM careers with their class. They are usually loaned to the nursery or reception for a half-term with a member of the Think Physics team on hand to run a workshop and support the teacher and their class at the start of the loan period.

[9] ibid
[10] http://www.gatsby.org.uk/uploads/education/reports/pdf/gatsby-sir-john-holman-good-career-guidance-2014.pdf
[11] https://www.wisecampaign.org.uk/resources/2014/11/not-for-people-like-me

10.3 Working with Families

Parental/carer support is essential to support the education of younger children. Many primary schools encourage parents to read with their children regularly, and some primary (and secondary) schools provide 'Maths / English for parents' meetings. In terms of future careers, parents and family members can also play an important role. Think Physics involves parents and carers in their children's science education and is particularly targeting those from low participation backgrounds and low science capital. One example is the development of a five week '*Science for families'* course in conjunction with North Tyneside Learning Trust. Aimed at increasing science capital in families, this course is practically based, and covers a variety of science topics mainly from the KS2 curriculum. Parents and children work together to carry out the practical work, and discuss the science ideas behind the practical. A key part of this discussion is to demystify the processes and nature of science. In essence, the theme of the course is that 'Learning about science isn't about always knowing the right answer, it's about asking the right questions.' Participating in the course encourages parents and children to consider science as something that they can do, and supports parents to take an interest in their child's science education. The course uses objects commonly found in the home, and the materials are written so that the family learning tutors (who may not have a science background) are able to deliver the course, once they are trained by the Think Physics staff. These courses are generally held in schools in low participation neighbourhoods.

10.4 Online support and encouragement

Providing a digital presence to support the face to face interactions has been an important aspect of the project. The website is the main mechanism and is regularly updated and used to link to other STEM initiatives and resources. It has also been used to continue support outside the face to face interactions and to also support wider engagement with the young person's family. This becomes increasingly difficult as children move up through school. For example after each Think Physics workshop, each child is given a postcard about the workshop to take home. These postcards have a simple picture linked to the activity that the child has been taking part in, some words of explanation or questions to ask, and a link to the schools page on the Think Physics website and are a way of extending the interaction with the child to also involve their parent/carer. Web page views can be tracked and as the school pages are not linked to the public face of the website so it is unlikely that the visits are accidental. http://thinkphysics.org/oakfield shows an example of a school page, with parental information and links to other resources on the Think Physics website.

10.5 Getting into 'Hard to Reach' Communities

Another key element of Think Physics is that it is taking science out to the community with a focus on those areas that would not traditionally engage with STEM. Examples include a science pop-up shop with a lunchtime science show in a local shopping centre; partnership with the arts community to combine a synthesis of science and art in local galleries (http://thinkphysics.org/blog/news/8-minutes-20-seconds-exhibition/); and work with home educated children and their families to offer STEM workshops at the Think Lab in Northumbria University. These latter workshops have proved very popular and are regularly fully booked.

10.6 Partnership working

Partnership working is a central ethos of Think Physics. There are many STEM initiatives and groups who are targeting schools, particularly in the secondary age group. Rather than duplicating these initiatives, we are working with this existing provision to actively participate and add value. Examples of these include events such as Big Bang North East, Maker Faire and Skills North East. During the year Think Physics has also built collaborations with a number of organisations and bodies including the Royal Institution, Engineering UK and the North East Chamber of Commerce.

List of Appendices

Appendix 1 Partner School Characteristics

Secondary - Cohort 1	Local Authority	Type of school	School capacity	Sixth Form	% Free School Meals	Special Measures
SA	North Tyneside	Foundation School	1022	Yes	12.2	No
SB	Northumberland	Academy Converter	2238	Yes	11	No
SC	North Tyneside	Foundation School	1284	Yes	12.7	No
SD	Newcastle	Academy Converter	2144	Yes	27.8	No
SE	Gateshead	Academy Converter	1496	Yes	12.8	No
SF	North Tyneside	Foundation School	905	No	7.8	No
SG	Newcastle	Academy Converter	1150	Yes	11.6	No

Secondary - Cohort 2	Local Authority	Type of school	School capacity	Sixth Form	% Free School Meals	Special Measures
SH	Durham	Academy Sponsor	1700	Yes	19.2	No
SI	Newcastle	Academy Sponsor	1800	Yes	60	No
SJ	Newcastle	Foundation School	1904	Yes	22.9	No
SK	Gateshead	Community School	1361	Yes	23.7	No
SL	North Tyneside	Foundation School	1010	Yes	14.4	No
SM	Durham	Academy Sponsor	1700	Yes	27.9	No
SN	Northumberland	Academy Sponsor	2870	Yes	32.6	No
SO	North Tyneside	Foundation School	951	Yes	15.3	No
SP	Durham	Foundation School	1350	Yes	15.3	No

Primary - Cohort 1	Local Authority	Type of school	School capacity	nursery	% Free School Meals	Special Measures
PA	North Tyneside	3 - 11	420	Yes	13.3	No
PB	Northumberland	4 - 11	420	No	1.4	No
PC	North Tyneside	5 - 11	420	No	51	No
PD	Durham	2 - 11	210	Yes	46.5	No
PE	Durham	3 - 11	350	Yes	23.5	No
PF	Gateshead	5 - 7	180	No	2.2	No
PG	North Tyneside	3 - 9	300	Yes	1.3	No
PH	North Tyneside	9 - 13	720	No	3.6	No

Appendix 2 Description of Project Activities

Detail of interactions for iThink Physics and Think Physics 4All:

2.1 i-Think Physics: Pre-school children and carers

Table 8 provides the number of pre-school children and carers that have been involved with Think Physics, including those who have used 'Show and Play' loans boxes.

Activity	Number of children	Number of parents / carers
Pre-school days at Life	216	168
Loan boxes	230	n/a
Loan boxes (Esh)	155	n/a

Table 8: Preschool activities

2.2 i-Think Physics: Primary

Table 2 provides the detail of the interactions with primary partner schools, and the type of activity that has taken place. The number of interactions as a percentage of the number of pupils in the school has also been calculated. In some schools, Think Physics has worked with each child multiple times.

The data in Table 9 show that Think Physics has worked with at least 1863 individual children across partner primary partner schools with a total of 3856 interactions. The project has also worked with 360 children from linked primary schools.

School	Size of school (2014-15)	Number of interactions	Year groups worked with	% of school
PA	453	1180	workshops for R, Y1, Y2, Y3, Y4 (twice), Assemblies for KS2 / Whole school	100%
PB	420	235	workshops for Y3, Y4, Y5, Y6	56%
PC	171	330	workshops for R, Y1, Y3, Y4, Y5, Y6, STEM fair Whole school	100%
PD	198	0		0%
PE	242	288	Workshops for Y1, Y2, Y3, Y4 (twice), Y5, Y6, STEM club for Y 5/6 students	100%
PF	418	916	workshops for Y1, Y2, Y3, Y4, Y5, Y6, Whole school show (delivered by Y6), loans box in N/R	100%
PG (first school)	344	907	workshops for Y1, Y2, Y3, Y4, Solar eclipse assembly for Y2-4	100%
PH (middle school)	724	0		0%

Table 9: Details of the interactions for cohort 1 primary schools

2.3 i-Think Physics: Secondary

Table 10 provides the detail of interactions with secondary partner schools, and the type of activity that has taken place. These data show that Think Physics has worked with at least 3010 individual children across secondary partner schools with a total of 3024 interactions. The project has also worked with 1073 secondary school children from linked schools.

School	size of school (2014-15)	number of interactions	Year groups worked with	% of school engaged
SA	726	91	Y11 -Sixth Form open evening, Y12 Careers session, Y10 Think Club	12.50%
SB	2178	424	Year 8 Assembly, Workshops for Y9, Y11, Y11-Sixth Form open evening, Y9 - STEM quest training	19.50%
SC	957	0		0%
SD	1907	225	Y10 Students to Big Bang, Y7 Peer Tutoring, Y9 workshop, Y9/10 Science busking, Y10 Think Club	12%
SE	1599	1613	Assemblies for all year groups, Y12 Life after Lord Lawson	100%
SF	780	656	Workshops for Y9, Y10, Assemblies for Y9	84%
SG	1104	15	Y11 - Sixth Form open evening	1%

Table 10: Details of interactions with Cohort 1 secondary Schools

2.4 Think Physics 4All: Family and Community Events

Table 11 provides the details of interactions with families and community events that Think Physics has been part of during the year. A number of these activities were targeted at low participation areas. Through these family and community events we have interacted with 3054 children, 818 parents/carers and 1277 other adults.

Activity	Details
Science for families course	5 week science course for parents and children. Developed by Think Physics, and delivered in conjunction with North Tyneside Learning Alliance. 46 families took part in at least 3 different primary schools.
Pop Up Shop	Working with shopping centre in an area of low HE participation to run a day of science-themed activities 210 children and carers visited the shop during the day.
STEM / career Fairs and career	Think Physics presence at one-off days in linked schools with families attending.
Large events	Participation in larger regional events such as Skills North East, Space Expo, Big Bang NE and Maker Faire UK.
Art-Science links	Working with local art galleries and artists to curate exhibits and events which link together science and art. http://thinkphysics.org/blog/news/8-minutes-20-seconds-exhibition/ http://vane.org.uk/exhibitions/yellow-giant

Table 11: Details of Interactions with Think Physics 4All strand of the project.

Appendix 3 Baseline data for A-level Physics

This appendix contains data for school pupils, including females and those from low participation neighbourhoods, studying A-level Physics. The raw data is given for academic years 2010-2013 and an average of the four years calculated for each school.

Cohort 1 consisted of 7 schools, cohort 2 consisted of 9 schools giving a total of 16 secondary schools. 15 of the secondary schools have sixth forms.

3.1 Number of pupils studying A-level Physics

A number of schools did not have sixth forms during some part of the last four academic years. This is indicated in the following tables by '*'

	2010-2011		2011-2012		2012-2013		2013 - 2014		Averages 2010-13	
	AS Level	**A2 Level**	***AS Level***	**A2 Level**	***AS Level***	**A2 Level**	***AS Level***	**A2 Level**	***AS Level***	**A2 Level**
Total for cohort 1	***64***	**45**	***86***	**40**	**74**	**39**	***83***	**34**	**76.75**	**39.5**
Total for cohort 2	***85***	**28**	***68***	**46**	***54***	**78**	***91***	**33**	***86.25***	**39**
Overall total	***149***	**73**	***154***	**86**	***128***	**117**	***174***	**67**	***163***	**78.5**

Table 12: Number of Pupils Studying A Level Physics in Partner Schools

3.2 Baseline numbers of female school pupils studying 'A' Level Physics

	2010-2011		2011-2012		2012-2013		2013 - 2014		Average academic years 2010-13	
	AS Level	**A2 Level**	**AS Level**	**A2 Level**	**AS Level**	**A2 Level**	**AS Level**	**A2 Level**	**AS Level**	**A2 Level**
Total for cohort 1	**15**	**6**	**16**	**10**	**15**	**6**	**17**	**7**	**16**	**7.25**
Total for cohort 2	**14**	**2**	**9**	**6**	**25**	**6**	**14**	**5**	**18**	**4.75**
Total for both cohorts	**29**	**8**	**25**	**16**	**40**	**12**	**31**	**12**	***34***	**12**

Table 13: Number of female school pupils studying A Level Physics in partner schools

3.3 Baseline numbers of school pupils for low participation neighbourhoods

Low participation neighbourhoods are calculated using the Income Deprivation Affecting Children Index (IDACI) Rank.. IDACI ranks range from 1 to 32482 with lower numbers indicating greater deprivation. A low participation neighbourhood is defined as one in 20% of the most deprived super output area's in England (rank < 6496)

	2010-2011		2011-2012		2012-2013		2013 - 2014		Average 2010-13	
	AS Level	**A2 Level**	***AS Level***	**A2 Level**	***AS Level***	**A2 Level**	***AS Level***	**A2 Level**	***A2 Level***	**A2 Level**
Total for cohort 1	**9**	**8**	**19**	**7**	**16**	**10**	**16**	**5**	**13.5**	**10**
Total for cohort 2	**9**	**4**	**11**	**4**	**16**	**9**	**17**	**8**	**13.25**	**6.25**
Total for cohort 1 and 2	**18**	**12**	**30**	**11**	**32**	**19**	**33**	**13**	**26.75**	**16.25**

Table 14: Number of pupils from low participation backgrounds taking A Level Physics in partner schools

Appendix 4 AS and A2 entries for Summer 2015 from Cohort 1 partner schools

The validated date for students entered for AS and A2 examinations in 2014-15 is not yet available from the National Pupil Database. However, the majority of partner schools have provided their initial data for the number of pupils who sat AS and A-level physics in June 2015.

Table 15: Number of pupils studying A physics in partner schools in 2014-2015

School	Number of pupils studying AS Level Physics in 2014- 15	Number of pupils studying A Level Physics in 2014-15
SA	-	7
SB	20	11
SC	-	5
SD	9	9
SE	12	10
SG	10	8
Total	**51**	**50**
- data not yet provided. * school does not possess a sixth form		

Appendix 5 Data for progression to higher education for students studying A-level Physics in partner schools

5.1 Type of university course

Table 16 shows a comparison of the number of students studying physics who progress to university, broken down by type of course. A large percentage of students' progress onto higher education.

	Number studying A Level Physics	Physics and Physics-related undergraduate course	STEM related undergraduate course	Any undergraduate course
Cohort 1	42	22	29	34
Cohort 2	38	21	28	32

Table 16. number of A-level Physics students who progress to undergraduate courses in the UK.

5.2 Physics and Physics Related Degrees Baseline

To further develop a baseline for progression, number of female students and those from low participation backgrounds are shown in *Tables 17a*, *17b* and *17c*.

Pupils have been defined as coming from low participation backgrounds if they are in the bottom 20% IDACI ranks.

The percentage of the total number of students taking A-level Physics in each year that this represents in each school is also provided. This is given in brackets in each table.

The data for 2013-14 is not yet available in the NPD-HESA database.

Table 17a: Baseline number of school pupils progressing to study physics and related undergraduate programmes across UK

	2010-11	2011-12	2012-13	Averages 2010 - 13
Total Cohort 1	**24**	**23**	**18**	**21.5**
Total Cohort 2	**17**	**28**	**23**	**23.4**
Total cohort 1 and 2	**41**	**51**	**41**	**44.9**

Table 17b: Baseline numbers of female school pupils progressing to study physics and related undergraduate programmes across the UK.

	2010-11	**2011-12**	**2012-13**	**Averages 2010 - 13**
Cohort 1	**3**	**3**	**1**	**2.3**
Cohort 2	**2**	**3**	**1**	**2**
Total	**5**	**6**	**2**	**4.3**

Table 17c: Baseline numbers of school pupils from low participation backgrounds progressing to study physics and related undergraduate programmes across the UK.

	2010-11	**2011-12**	**2012-13**	**Averages 2010 - 13**
Cohort 1	**3**	**7**	**6**	**5.4**
Cohort 2	**0**	**3**	**3**	**2**
Total	**3**	**10**	**9**	**7.4**

Appendix 6 – Outline qualitative research plan

Science Capital

Recent research (Aspires, 2013) has focused on the importance of science capital in developing pupils aspirations towards STEM. The 5 year longitudinal study found that pupils from families with medium or high science capital are more likely to aspire to science and STEM-related careers and are more likely to plan to study science post-16. Science capital can be defined as:

"Science capital refers to science-related qualifications, understanding, knowledge (about science and 'how it works', interest and social contacts (e.g. knowing someone who works in a science-related job)." pg 3. Aspires (2013)

Think Physics will build on and contribute to this research on science capital by capturing a baseline of science capital from primary and secondary school pupils, among primary school teachers, and in secondary school pupils in our partner schools. This baseline will allow comparison of the North East with other national science capital studies such as Aspires. Taking a baseline on science capital and then repeating these measures with the same groups two years later, will also allow us to measure to what extent Think Physics is increasing science capital in children in Think Physics schools.

Gathering a Baseline

1. Primary School Pupils	A baseline will be gathered from primary school pupils in Year 3 and Year 5. *Year 3* 1st year - 30 pupils x 3 schools = 90 pupils 2nd year – 30 pupils x 6 schools = 180 pupils Total = 270 primary school pupils Data collection will be carried out again two years later when pupils are in Year 5 to measure the impact of the Think Physics project. *Year 5* 1st year - 30 pupils x 3 schools = 90 pupils 2nd year – 30 pupils x 6 schools = 180 pupils Total = 270 primary school pupils Data collection will be carried out again two years later with the same year groups to measure the impact of the Think Physics project.

2. Secondary School Pupils	A baseline will be gathered from secondary school pupils in Year 7, Year 9 and Year 11. *Year 7* 1st year – 200 pupils x 2 schools = 400 pupils 2nd year – 200 pupils x 4 schools = 800 pupils Total = 1200 pupils *Year 9*

	1st year – 200 pupils x 2 schools = 400 pupils 2nd year – 200 pupils x 4 schools = 800 pupils Total = 1200 pupils *Year 11* 1st year – 200 pupils x 2 schools = 400 pupils 2nd year – 200 pupils x 4 schools = 800 pupils Total = 1200 pupils Data collection will be carried out again two years later with the same year groups to measure the impact of the Think Physics project. Destinations of pupils will be tracked through to AS and A2 Level and Undergraduate level via NPD/HESA data to measure the effect of the Think Physics project on uptake of Physics and related degrees at undergraduate level.

Research Tools

1. Primary School Pupils	• Short questionnaire on science capital to pupils using smiley Likert scales • Visual methods research tools – 3 activities which measure science capital through sorting and ordering in groups. • Filming and analysis of the pupils's interactions will allow evaluation of the pupils's value structures and beliefs. Topics and questions covered in primary resource tools will be a simplified and reduced form of secondary research tools. This will provide the ability to track science capital over time.
2. Secondary School Pupils	• Science capital questionnaire to be gathered from whole year groups to gather a representative sample. • Focus groups for selective groups building on areas of interest arising in questionnaires. Same questionnaire to be used with Year 7, Year 9 and Year 11 to provide the ability to track science capital over time.

Measuring success

Pupils will be tracked over two key periods (Year 3 – Year 5) (Year 7 – Year 9) and (Year 11 – post 16 destinations). A baseline will be gathered in Year 3, Year 5, Year 7, Year 9 and Year 11.

The initial data collection provides a baseline level of science capital for pupils in our partner schools. After two years a follow up survey/activity will be conducted. Analysis will provide the ability to:

- Evaluate year groups over time as they progress through school (Year 3 in 2015 with Year 5 in 2017)
- Compare data from the same year group over time (Year 5 data from 2015 with Year 5 data from 2017)

Appendix 7 Progress against key milestones

The first staff for the project were in place by May 2014. However, the majority of the team was not in place until academic year 2014/15, and school activities will be delivered until the end of the academic year 2016/17. This means that the project will run for more than three calendar years in total.

	Target	Key milestone	Key risks[12]	Actions to mitigate the key risks	Anticipated completion date (Year, Month)	Anticipated outcomes	Progress towards milestone
1	**YEAR ONE**						
1.1	Project resources (staffing, management and governance, space) all in place	Think Physics Centre in place with identified team.	No suitable applicants for new posts (6)	Target appropriate channels for recruitment including existing extensive network of contacts and channels.	Y1 M3	Strong core and identity from which to springboard Think Physics	Whole team in place by October 2014
1.2	Work with identified set of schools (minimum 10) to draw up local action plans for i-Think Physics strand	Local action plans in place and overall project plan for i-Think Physics	Lack of engagement from schools (1) Lack of support from Think Physics project team (7)	Key partners in project from Learning Trust and LEAs to provide link and support to schools plus also drawing on our WP NU Entry scheme which currently comprises 14 schools across the regional LEAs. Recruitment of project team to ensure staff meet person specification	Y1 M6	Active engagement and local ownership from schools in Think Physics project	Initial schools approached and signed up. 7 secondary, 8 primary. October 2015

[12] Key Risks number in parenthesis refers to number given in Long Business Plan

1.3	Work with partners to create detailed action plan for Physics4All Strand	Detailed action plan for Physics4All in place	Lack of engagement from partners (2)	Partners engaged in project from first conception and management/governance structures in place to maintain engagement	Y1 M6	Ownership of project and associated commitments by all partners.	Activities with partners identified. Events booked at Kielder and collaboration with other partners including Centre for Life and North Tyneside Local Authority and Learning Trust planned. Other opportunities will be introduced as and when they arise.
	Target	**Key milestone**	**Key risks**	**Actions to mitigate the key risks**	**Anticipated completion date (Year, Month)**	**Anticipated outcomes**	**Progress or modifications to plan**
1.4	Establish baseline data for project evaluation and impact	Baseline data in place	Unable to get data (3)	Baseline data will draw on established data sets supplemented by qualitative information gathered from the partner schools through small focus groups to establish baseline views on science and physics, particularly its application and career opportunities	Y1 M8	Identification of current status of WP, gender and physics across the Tyneside region	Numbers gathered from partner schools showed that original measures did not capture the full extent of the project activities. Application for NPD-HESA linked data has been successful and this data will provide information about the Partner schools data. Initial tools for qualitative data around social capital, particularly in primary schools, have been developed.

1.5	First round of activities completed with schools and partners	Year one activities for both strands of Think Physics completed	Low participation rates in activities (5) Low satisfaction feedback on activities (4)	School based activities will be with an identified set of partner schools which have drawn up action plans so have already shown commitment Activities will be designed based on good practice from previous studies and projects. Feedback will be gathered on individual activities from participants to evaluate their effectiveness and impact and used to inform future activities.	Y1 M12	Increase in awareness of physics and science across partner schools, children and their parents/carers	Activities completed. Work carried out with both partner schools and linked schools. See engagement data for details.
1.6	Review Year One to inform plans for Years Two and Three	Interim report produced to evaluate year one activities and plans for subsequent years	Report not completed in time (8)	Project management in place to ensure team is on task	Y2 M1	Evidence to inform future project activities	Team reviewed work carried out in Year 1. Vision and rationale fine-tuned and offer to partner and linked schools clarified. Baseline data on progression from AS to A2 level highlighted need to support students to complete the full A-level.
2	**YEAR TWO**						
	Target	**Key milestone**	**Key risks**	**Actions to mitigate the key risks**	**Anticipated completion date (Year, Month)**	**Anticipated outcomes**	**Progress or modifications to plan**

2.1	Extend local plans to work with 30 schools, including feeder primary and secondary pairing where possible.	Local action plans in place for i-Think Physics in each partner school and overall project plan	Lack of engagement from schools (1)	Key partners in project from Learning Trust and LEAs to provide link and support to schools	Y2 M4	Active engagement and local ownership from schools in Think Physics project	10 additional secondary schools were approached in Summer 2015. Feeder primary schools were approached in Sept 2015. A total of 30 partner schools will be worked with from year 2 onwards
2.2	Continue to roll out activities for both strands of Think Physics	Year two activities complete for partner schools and overall	Loss of partner schools (9)	This may happen due to other factors outside the project team's control. If number of partner schools decreases below 30, then linked schools with appropriate demographic will be approached to become a partner school.	Y2 M12	Increased engagement with physics and science across partner schools, children and particularly girls, their parents/carers and the wider community	In progress. Focus in secondary schools has been clarified to include a suite of age-specific assemblies. Also work with schools to identify ways encourage students to progress from AS to A2. Further develop interventions targeted at girls using unconscious bias and other research findings.

	Target	**Key milestone**	**Key risks**	**Actions to mitigate the key risks**	**Anticipated completion date (Year, Month)**	**Anticipated outcomes**

2.3	Use results so far to seek external support and funding e.g. sponsorship of events, and other aspects of the project	Interest from external organisations in Think Physics	No extra interest from external organisations (10)	Ensure there is a clear dissemination strategy from outset of project that is aimed at external audience across industry, education and the public.	Y2 M12	Evidence of potential of project to become a regional blueprint.
2.4	Review Year Two to inform plans for Year Three and beyond	Interim report produced to evaluate year two activities and plans for subsequent years	Report not completed in time (8)	Project management in place to ensure team is on task	Y3 M1	Evidence to inform future project activities and long term sustainability of project
3	**YEAR THREE**					
3.1	Review local action plans with current partner schools and continue identified activities for Year 3	Year two activities complete for partner schools and overall	Loss of partner schools (9)	This may happen due to other factors outside the project team's control. Expanding the partner schools each year should help compensate for any schools that drop out.	Y2 M12	Increased engagement with physics and science across partner schools, children and particularly girls, their parents/carers and the wider community
3.2	Review process for local action plans and establish sustainable blueprint for school engagement	Blueprint established for continuing local action in schools	Unable to provide sustainable plan (11)	Ensure sustainability is a key element of the local action plans from the beginning. Involve project partners such as the LEAs and Trusts to provide stable platform for future engagement.	Y2 M9	Sustainable blueprint for WP and gender success for physics among children and schools
3.3	Review Think Physics 4All Strand and establish action plan for sustainability	Sustainable blue print established for Physics 4All strand	Unable to provide sustainable plan (11)	Ensure sustainability is a key element of the Physics 4All strand from the outset. The partnership ethos and work to look for new partners from year two should also help mitigate the risk here.	Y2 M9	Sustainable approach to WP and gender for children and physics among external stakeholders

3.4	Establish structure and process for partner engagement and network beyond lifetime of project	Network of partners to continue work of project beyond its lifetime	Unable to get commitment from partners (2)	The project needs to understand the drivers and motivation from the different partners and ensure these are incorporated into the final structures and processes.	Y2 M9	Network of partners to continue and build on good practice from project

	Target	**Key milestone**	**Key risks**	**Actions to mitigate the key risks**	**Anticipated completion date (Year, Month)**	**Anticipated outcomes**
3.5	Gather final evidence to evaluate success of Think Physics	Evidence base to evaluate success criteria at end of project	Unable to gather all required evidence (3)	Ensure data for evidence base identified at outset of project and mechanisms in place to gather it as project progresses.	Y3 M11	Increase in uptake of physics by children and girls at A Level and university from across the region. Greater understanding and awareness of physics and its context across the region.
3.6	Draw up regional blueprint and disseminate	Dissemination of a regional blueprint	Unable to determine a regional blueprint (12)	Project activities and ethos is built on good practice identified in earlier studies combined with a more holistic and partnership approach to ensure its sustainability and basis for a regional blueprint but it is recognised an outcome may be that this approach is not effective.	Y3 M12	Outline of an effective regional blueprint for widening participation and gender that can be shared elsewhere Seminars to publicise the findings and successes of the project.

Appendix 8 Equality Impact Assessment

School, Service or Committee	Faculty of Engineering and Environment
Name of policy :	Think Physics
Name(s) of those undertaking the Equality Analysis:	Annie Padwick, Carol Davenport
What are the main aims of this policy?	The aim of this policy is to consider the effects of Think Physics policies on people with respect to disability, gender, (including gender identity), racial equality, and other groups that have low participation in Science, Technology, Engineering and Mathematics. It aims to look for opportunities to promote equality that may have previously been missed or make better use of them. It also aims to identify and monitor negative or adverse impacts and to work to remove or mitigate them where possible. Think Physics aims to develop greater insight into the means through which children, and particularly females and other under-represented groups can be successfully encouraged to engage in sciences and particularly physics by their families, teachers, senior school management, academic staff, employers and other stakeholders. By developing this understanding Think Physics aims to increase the number of girls and under-represented groups taking up A Level Physics and continuing onto STEM disciplines at University.
Who are the main stakeholders of the policy?	The Think Physics project has a broad stakeholder base. There are two strands to the Think Physics project: *I Think Physics*: The main strand of the project is aimed at children and young people from pre-school to University age. The emphasis is on engaging children from an early age, with a focus on science more generally at early years, progressing through to a more specific focus on physics at secondary school. *Think Physics 4 All*: This second strand is aimed at the children's support network i.e. teachers, parents and the wider community. Its focus is on educating this community about the benefits of physics and ensuring this support network is equipped to support, engage and inspire the students themselves.
Who is responsible for developing this policy?	Annie Padwick
Is this a new or existing policy?	New
Who is responsible for approving it?	Rebecca Strachan

Who is responsible for implementing it?	Carol Davenport
Is the policy equality relevant?	Yes. The policy affects children, young people, teachers, parents and the wider community. It involves face-to-face contact and could have a significant impact on someone's life and wellbeing. The policy has the potential to affect different protective groups differently.
Is there the possibility of discrimination or adverse impact?	Yes. There is the possibility that any programmes aimed at addressing the gender imbalance or encouraging under-represented groups could be seen to discriminate against males or other non-minority groups.
Does the policy provide an opportunity to promote equal opportunities?	Yes
Does the policy provide the opportunity to foster good relations between people from different groups?	Yes, Think Physics aims to break down the stereotypes and barriers for females and under-represented groups in STEM and provide the opportunity to foster good relations between people from different groups.
Please identify what data has been collected in relation to this policy:	An EQIA was undertaken at the beginning of the project to inform and benefit this policy development and working practices. Knowledge is being built in these in these initial stages through evaluation and application of existing research and studies into Equality and STEM, existing University policy and existing datasets.
Please identify any internal/external groups consulted regarding this activity:	Internal groups consulted: • Think Physics Regional management group which includes representation from academics, University Widening Participation team, University Project Juno team and partner organisations. • Think Physics Advisory Group Resources from external groups • Equality and Human Rights Commission – Equality Impact Assessment Quick Start Guide • Encouraging equality and diversity – Working towards equal opportunities in STEM subjects and careers (2011) • Aspires, young people's science and career aspirations age 10 – 14 • Institute of Physics – Its different for girls, the influence of schools • UK Science and Discovery Centres: Effectively engaging under-represented groups (2014)

Considering Evidence and Data

Please use this section to consider evidence and data to properly assess the likely or actual impact on each of the groups in turn. You should consider wide ranging data sources such as any relevant surveys, archived materials, database records, audits, consultation results, research, studies, reports feedback etc regarding this particular function or policy.

Analyse the existing evidence and data. What does it tell you? Provide relevant or necessary details in the columns below:

General Observations	The Think Physics project is compliant with Northumbria University's Equality and Diversity Policy: https://intranet.northumbria.ac.uk/facultiesandservices/hri/guidance/azpolicy/edpolicy/. All Project Team members have attended the University's Equality and Diversity training. Think Physics aims to use physics to inspire young people, particularly females and under-represented groups into Science, Technology, Engineering and Mathematics (STEM) disciplines. When referring to under-represented groups, Think Physics has agreed to focus particularly on low socio-economic status. Low socio-economic status will be measured through Pupil Premium and Income Deprivation Affecting Child Indices. As a project with a focus on gender and under-represented groups in STEM, it is natural that policies and working practices will consider and monitor the impact of the project on these groups. However this has the potential to jeopardise the consideration of the programme on other protected groups. The project will work to ensure neutral impact on the other protected groups.
Age	Think Physics aims to inspire and support children from cradle to career. Current initiatives and programmes in the i-Think Physics strand are aimed at children from pre-school through to University age. The project is working with primary schools, secondary schools and nurseries in the region and this broad age range enables the project to be inclusive of all ages. Specific workshops and activities may be age or key stage dependent. This is because workshops will usually tie in loosely an area of the National Curriculum being taught at that age/key stage. However as not all pupils will be at the same key stage at the same age, it is preferable to talk of key stage rather than age where appropriate. The aims to support uptake of physics at A-Level and uptake of STEM related subjects at University. While the project has currently targeted secondary schools for the focus of this support, the project could consider support to further education institutions and initiatives which support mature students into STEM related disciplines at University. The impact around age is likely to be no impact, however this could become a positive impact through the introduction of these initiatives.
Disability	Disability has not had a strong STEM presence, but there is a continuum for change. Think Physics is working with at least one school for children with disabilities, however at present disability is not a key area of focus. The project is likely to have no impact on this protected group.
Gender Reassignment	The project is likely to have no impact on this protected group.
Marriage and Civil Partnership	The project is likely to have no impact on this protected group.
Pregnancy and maternity	The project is likely to have no impact on this protected group.
Race	The Think Physics project aims to inspire students from specific ethnic backgrounds who are under-represented in STEM, both in school qualifications and STEM careers. The picture relating to the participation of black and minority ethnic young people (BME) in STEM careers is a complex one,

	with participation in some STEM careers being over-represented, for example business, accountancy and technology, compared to the participation of white young people in these careers. Think Physics project needs to seek further information about demographics in the region, the take up STEM subjects at A Level and progression on to University, before positive impacts could be achieved in this area. This project has no impact on this protected group at this stage.
Religion or Belief (or lack of religion or belief)	Think Physics project will maintain an awareness of different religions or beliefs. It is important to ask young people if they have specific needs with regards to their religious beliefs. It might be that some industries are unacceptable due to a young person's faith. The most obvious sectors are the defence industry, brewery/alcohol production, stem-cell research and some areas of food production. However it is also important not to stereotype a young person and make assumptions based on their faith. (*Encouraging equality and diversity – Working towards equal opportunities in STEM subjects and careers*). The project at present is likely to have no impact in terms of religion and belief. If religion and belief are not well considered at the project development stage then this could lead to negative impacts.
Sex	Gender is probably the area of equality and diversity that has been researched in STEM the most and therefore there is a host of information available for practitioners to draw on. Although STEM subjects have seen a recovery in popularity in secondary education in recent years (mathematics has had an increase of 53% and physics an increase of 26% between 2006–2012), currently only 21% of undergraduate students in physics are female. This gender imbalance is a significant limiting factor in the sustainability of the subject and its related disciplines and also represents a problem with ensuring an equitable national system and widening participation. It is important that gender stereotypes are actively challenged by everyone. An important element of this is addressing the general lack of knowledge among young people about certain job roles, including those in STEM. There is evidence that gender preference for STEM subjects becomes more pronounced between Years 7 and 9. Think Physics approaches this gender imbalance through equal gender numbers and through some specialist events for girls. It works to create positive female role models for young people in the North East which show the range of employment opportunities available. It delivers targeted schools careers workshops at key transition points and during key qualification selection stages. When recruiting to specific mixed gender Think Physics activities from partner schools, the project ensures that an equal number of males and females are requested. This ensures that there less risk of gender imbalance in our activities and workshops. The project also has a number of positive action initiatives that support females to build their knowledge and confidence in Physics and Engineering subjects and related career paths, such as the Reece Summer School in Engineering for Year 12 female students which is targeted at females only. However the project aims for a mix of female only and mixed gender activities. The former aimed at providing a more supportive environment for females as they are often in a male

	dominated environment at school. The latter to ensure that the project is providing a balanced gender environment with opportunities for both genders to work together. The impact of these on females is likely to be positive. However, it is also possible that these initiatives could dissuade females from certain careers if they are not done well. Workshops, activities and initiatives aimed at mixed gender groups need to be monitored to ensure that they appeal to both genders. There is the possibility that any programmes aimed at addressing the gender imbalance or encouraging under-represented groups could be seen to discriminate against males.
Sexual Orientation	Young people, for a variety of reasons, often face discrimination when trying to access a whole host of careers. Accessing STEM careers can provide extra challenges to those who may be perceived as non-traditional entrants e.g. young women into construction work or engineering careers. If these young people also face issues related to their sexual orientation and gender identity then any problems they are already facing accessing STEM careers could be exacerbated. The project is likely to have no impact on this protected group.

Is there enough data for an accurate judgement to be made?	YES

If YES, please go to Section 3. If NO, please explain:

Where do the gaps exist?	
An interim Analysis can be undertaken. In this case, what further data do you intent to collect and in what time-scale?	

Please continue to Section 3 and complete as fully as possible.

Assess the likely impact on Equality Groups and consider alternatives if necessary

Based on your findings above, please tick ✓ the appropriate boxes below and summarise your reasons where appropriate.

Equality Group	Negative Impact	Positive Impact	No Impact	Unknown	Reasons
Age			X		Working with young people only
Disability			X		Activities will be adapted (with teacher input) for students with disabilities.
Gender Reassignment			X		Students will be treated as their preferred gender identity.
Marriage and civil partnership			X		Working with young people only

Pregnancy and Maternity			X		Working with young people, so unlikely to have maternity issues. However, if a pupil is pregnant we will carry out a risk assessment to allow them to safely take part in activities.
Race			X		Not a focus of the project.
Religion or belief			X		Not a focus of the project.
Sex		X			
Sexual Orientation			X		Where appropriate workshops and discussions will be inclusive of sexual orientation.

If you have indicated there is a negative or positive impact on any group(s), is that impact:

	YES/NO	Please provide details
Legal/Lawful – is the function/policy directly or indirectly discriminatory and permitted under UK legislation?	YES	
Intended – can it be justified under the Act(s)?	YES	
Could you make changes to the function/policy or its implementation to prevent or minimise any adverse impact or unlawful discrimination, while still achieving the aims?	YES	Where initiatives are targeted at small groups of pupils, we request that schools provide equal numbers of female and male pupils to allow access to the activities equally to both genders.
Could you consider alternative processes/policies that might provide equality better?	YES	We are monitoring research in the area of gender equality in STEM subjects, and will adapt interventions should research suggest better ways of approaching the issue.
If the impact is positive how will this be safeguarded?		During the project, individual elements, such as the digital presence, and activities etc. will be continually reviewed to ensure that the aspects which have led to the positive impacts are built into any future developments.

Recommendations

Please indicate your findings on the basis of your analysis.

No major change: the policy is robust in relation to equality and can progress as planned.	X
Adjustment required: there are some barriers or potential for adverse impact and the policy should be adjusted accordingly.	

Continue as planned: there is the potential for adverse effect. However the adverse impact can be objectively justified and there is no risk of unlawful discrimination. Please indicate the objective justification for this and how the decision was reached.	
Stop and remove the policy: there is the potential for adverse impact which cannot be justified or mitigated and / or there is a risk of unlawful discrimination.	

Developing an Action Plan

As a result of this analysis, consultation, research and available evidence collected please state whether there will need to be any changes made/planned to the policy. Please specify what practical actions need to be taken to either reduce or remove any identified negative impact.

Action Required to Address the issue(s)	Timescales	Responsible Lead
Not required		

NB: it is important that these objectives and the actions are incorporated into School or Service operational or work plans as appropriate.

Monitoring and Review

Is this a Full or Interim Analysis?	Full
Planned date of Analysis?	Every 3 months
Have you set up a monitoring/evaluation/review process to check the successful implementation of changes to the function/ policy?	The EIA is a standing item on the project regional management group. EIA will be regularly reviewed during project lifecycle and if found, we will review frequency of monitoring
Please explain how this will be done?	Through the Think Physics Regional Management Meetings

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Equality Analysis completed by:

Name:	Annie Padwick	**Date:**	2/09/2015
Job Title:	Think Physics Coordinator		

Nominated person: I confirm that I have been briefed and agree with the results of this Equality Analysis.

Name:	Rebecca Strachan	**Date:**	5/09/2015
Job Title:	Associate Dean for Business and Engagement, Faculty of Engineering and Environment		

Please note the following:

It is essential that this full Equality Analysis is discussed by your Management Team and remains readily available for inspection.

Please forward this completed Equality Analysis to equality@northumbria.ac.uk

Appendix 9 Risk Register

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ID Number	Risk Short Name	Risk Owner	Category	Risk Description (incorporating causes)	Effects (Consequences)	Current Controls/Mitigation (Lead Role)	Controls Adequacy	(Current) Likelihood (1-4)	(Current) Financial Impact (1-4)	(Current)Project Delivery Impact (1-4)	(Current) Reputational Impact (1-4)	(Current) Max Impact (1-4)	(Current) Risk Rating L x I (1-16)	Red Warning (TRS Above 9.9)	Future Controls/Mitigation Improvement	Partners for Implementation of Improvement (By Whom)	Timescale (By When)	(Post Control) Likelihood (1-4)	(Post Control) Financial Impact (1-4)	(Post Control) Service Delivery Impact (1-4)	(Post Control) Reputational Impact (1-4)	(Post Control) Max Impact (1-4)	(Post Control) Risk Rating L x I (1-16)
1	Secondary School Engagement	CD	Partnerships	Lack of engagement from secondary partner schools and loss of secondary partner schools	A loss of partner schools or a loss of commitment from partner schools would mean that it might be difficult to meet project numbers and project targets.	Within schools we are identifying the key people to work with for different interactions and identifying key STEM needs of the school to ensure that we try to meet these.	Average	3.0	1.0	3.0	2.5	3.0	9.0		We have recently approached 10 more partner secondary schools. Communication to all schools is emphasising the need for holistic approach to STEM, and meetings are being arranged with key staff beyond science. We will continue to monitor.	Carol Davenport Annie Padwick	December Year 2	2.0	1.0	2.5	1.5	2.5	5.0
2	Low Satisfaction on Activities	CD	Reputation	Low satisfaction feedback on activities	The reputation of the Think Physics project and initiatives could be damaged if there is low satisfaction on activities, this could lead to a drop in participation of future events and lack of engagement from partners.	We are evaluating and building on the research and good practice of other organisations and intiatives. In the initial stages we are ensuring that all activities are evaluated and reviewed.	Average	1.0	1.0	1.0	1.5	1.5	1.5		We will continue to run pilots of our longer-term intiatives before roll-out to test and review how this works. We will build on good practice within SciComm and education to structure activities.	Carol Davenport, Joe Shimwell	End of Year 2	1.5	1.0	1.0	1.0	1.0	1.5
3	Participation of Think Physics 4 All	CD	Reputation	Low participation rates for Think Physics 4 All Strand particularly from parents	The consequence of low participation rates would be that young people would be less supported to choose STEM careers by their parents.	We have developed a 'science for families' course which has been positively received. We are looking to offer this to partner schools. Other 'for family' activities are being developed e.g. pop-up shops, art-science events.	Average	2.0	1.0	2.0	2.0	2.0	4.0		We will continue to collaborate with partner schools and organisations and seek support from other organisations to develop the parental and wider aspects of the Think Physics 4 all strand.	Carol Davenport	End of Year 2	1.8	1.0	1.5	1.5	1.5	2.7
4	Partner Expectations	CD	Partnerships	Partner, key stakeholder and employer expectations are not managed or met.	If partner, key stakeholder and employer expectations are not managed and met we could lose partners and damage our reputation for key stakeholders and employers. This in turn would damage the projects effectiveness and likelihood of achieving targets.	We are working with partners to collaborate on initiatives which meet Think Physics and partner organisations agendas. We have been developing relations with key stakeholders and employers to raise awareness of the Think Physics project, these relationships will need to be managed.	Good	2.0	1.5	1.5	2.5	2.5	5.0		We will continue to develop a communication strategy to ensure regular relevant communication with partners. Discuss with partners how we can work better together, what would they like from the project? What can they offer?	Annie Padwick, Jonathan Sanderson	End of Year 2	2.0	2.0	2.0	1.5	2.0	4.0
5	Baseline Data	Api	Research (Incl. PGR)	Baseline and qualitiative data not gathered or used effectively - long term staff sickness limiting research that can be carried out.	If we do not gather realistic data and have the right processes for analysing using this, we will not be able to effectively measure and demonstrate the impacts of the project.	NPD data has now been recieved and analysed. The application will need to be renewed each year. We have been discussing with other researchers to identify or develop research tools which will allow us to measure attitudinal change towards STEM within primary schools. We have temporarily employed two research assistants to continue the research whilst other staff are on long term sick.	Average	2.5	1.0	1.0	1.0	1.0	2.5		Two members of staff will be trained in the use and analysis of the NPD. Collaboration and discussion with researchers at other universities will continue.	Carol Davenport, Rebecca Strachan	December Year 2	1.5	1.0	2.8	2.5	2.8	4.2
6	Processes and Procedures	Apa	Operational	Effectiveness limited by University processes	Slow university procedures could limit the provision of activities, lead to loss of opportunities, and lead to staff making excessive use of petty cash to ensure that materials arrive on time.	Ensure that new staff receive training and support in necessary University systems and policy and procedures. Where possible, materials to be ordered at least 8 weeks before they are required. Orders which have not been received are chased after 3 weeks.	Average	3.0	3.0	3.0	2.0	3.0	9.0		Where possible, materials are ordered at least 8 weeks before they are required. Orders which have not been received are chased after 3 weeks. Use of Petty Cash/Expenses is monitored. Continue to monitor and discuss possible solutions with the faculty.	Annie Padwick	End of Year 2	4.0	2.0	2.0	1.0	2.0	8.0
7	Sustainability	CD	Financial	Unable to identify sustainable funding to create longevity for the Think Physics project	If we are unable to identify sustainable funding for the Think Physics project, the project may not be able to continue past the current 3 year funding period.	We are working with the Development and Alumni Relations team to identify suitable sources for future funding, the pre-award team to identify suitable funds and suitable bids. We are also building links and supporting activities with faculty and university so that there is a case for the university/faculty funding the project beyond three years.	Good	3.0	3.0	2.0	2.5	3.0	9.0		We will work to identify new partners and employers and invite them to be part of the project. Where appropriate we will either apply for funding bids in our own right, or support those submitted by university colleagues. Work to ensure joined up approach to linking Think Physics to Faculty and University Impact Strategy.	Carol Davenport, Rebecca Strachan	End of Year 2	2.5	3.0	2.0	2.0	3.0	7.5
8	Regional Blueprint	CD	Reputation	Unable to develop a regional blueprint	If we are unable to determine a regional blueprint there will be restricted legacy value.	We are developing our unique selling points, and promoting what make our project different than others. The website is used to distribute national findings, and presenting our findings and way of thinking at appropriate conferences and meetings.	Average	3.0	2.0	2.0	2.0	2.0	6.0		We aim to raise our profile on the national and international stage, by attending relevant national and international events, seeking national and international media coverage. We plan to talk to other projects with a wider remit about their models for expanding regional blueprint. The website could form the central hub of a national project with regional hubs.	Carol Davenport	End of Year 2	2.8	2.0	2.0	2.0	2.0	5.6