

Practical on Public Engagement

Gabrielle Provan

**STFC Introductory Solar System Plasmas
Summer School.
University of Exeter, 2018.**



UNIVERSITY OF
LEICESTER

WHAT IS PUBLIC ENGAGEMENT?

Lots of terms are used when describing public engagement with research. These include:

- (1) Outreach
- (2) Collaborative research
- (3) Citizen science
- (4) Lifelong learning
- (5) Community engagement, and engagement with partners
- (6) In addition universities engage through community based learning, widening participation, corporate social responsibility etc.

What all these terms have in common is describing an aspiration to better connect the work of universities and research institutes with society.

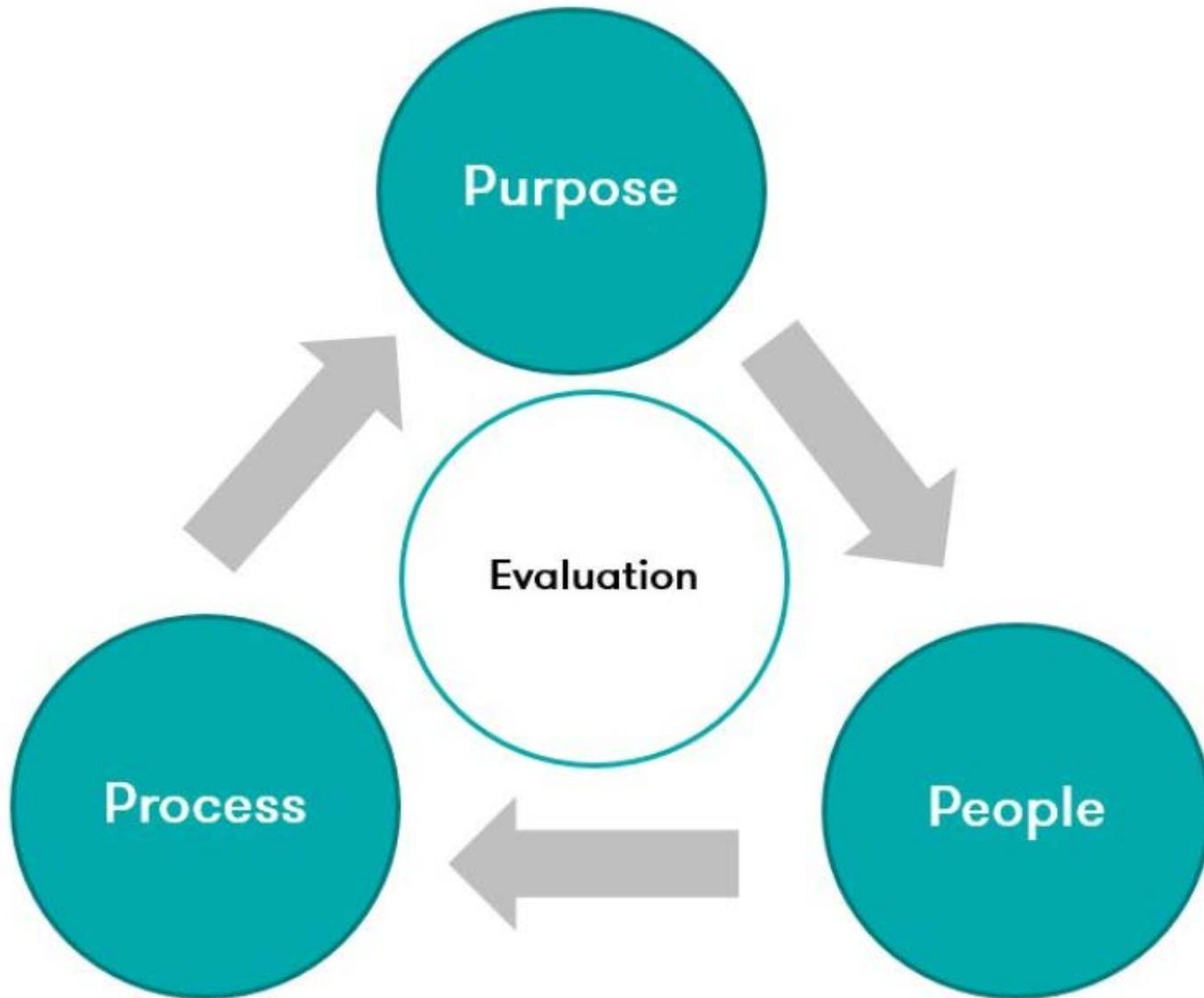
WHAT IS PUBLIC ENGAGEMENT?

National Co-ordinating Centre for Public Engagement (NCCPE) – funded by RCUK and the higher education funding councils. NCCPE **mission** is to support universities to increase the quality and impact of their public engagement activity.

‘Public engagement describes the myriad of ways in which the activity and benefit of higher education and research can be shared with the public. Engagement is by definition a two-way process, involving interaction and listening, with the goal of generating mutual benefit’



THE FOUR PRINCIPLES FOR HIGH QUALITY PUBLIC ENGAGEMENT



- Purpose: Why are you doing the engagement?
 - People: Who is involved in the project as participants, partners, or deliverers of the project? How have you considered their needs and interests in developing your approach?
 - Process: Is the process appropriate to the purpose and people you are engaging with?
 - Evaluation: Have you considered how to use evaluation to both inform your approach, and to assess its value?
- National Co-ordinating Centre for Public Engagement.

WHY SHOULD STFC SCIENTISTS ENGAGE WITH THE PUBLIC?

(1) Public engagement is a royal charter requirement for STFC.

Royal Charter

Made: 7th February 2007

Coming into force: 1st April 2007

At the Court at Buckingham Palace, the 7th day of February 2007

Present: The Queen's Most Excellent Majesty in Council

The Science and Technology Facilities Council is established by Royal Charter for purposes connected with scientific research and consists of persons appointed by a Minister of the Crown.

In accordance with section 1(4) of the Science and Technology Act 1965[1] a draft of this Order has been laid before and approved by a resolution of each House of Parliament.

Accordingly, Her Majesty, in exercise of the powers conferred upon Her by section 1(1)(c) of that Act, is pleased, by and with the advice of Her Privy Council, to declare as follows:-

1. The Science and Technology Facilities Council, whose objects are specified in the Schedule to this Order, is established as a Research Council for the purposes of the Science and Technology Act 1965.
2. This Order may be cited as the Science and Technology Facilities Council Order 2007 and shall come into force on 1st April 2007.

Christine Cook

Deputy Clerk of the Privy Council

Schedule

Objects of the Science and Technology Facilities Council

This mission provides the underlying framework for our entire portfolio of operations and activities as we focus on delivering world-beating science and technology.

The objects for which the Council is established and incorporated are:-

- To promote and support high-quality scientific and engineering research by developing and providing, by any means, facilities and technical expertise in support of basic, strategic and applied research programmes funded by persons established in Our United Kingdom and elsewhere.
- To promote and support, by any means, high-quality basic, strategic and applied research and related post-graduate training in astronomy, particle physics, space science and nuclear physics and research in any other field which makes use of scientific facilities where access is provided, arranged or otherwise made available by the Council, having regard to the objects of the other research councils.
- To promote and support the advancement of knowledge and technology (including the promotion and support of the exploitation of research outcomes) and to provide trained scientists and engineers, and thereby to contribute to the economic competitiveness of Our United Kingdom and the quality of life of its people, meeting the needs of users and beneficiaries.
- In relation to the activities as engaged in by the Council above and in such manner as the Council may see fit:-
 - to generate public awareness;
 - to communicate research outcomes;
 - to encourage public engagement and dialogue;
 - to disseminate knowledge; and
 - to provide advice.

WHY SHOULD STFC SCIENTISTS ENGAGE WITH THE PUBLIC?

- (1) Public engagement is a royal charter requirement for STFC.
- (2) STFC has a public engagement policy for 2016-2021.



Inspiring & Involving

Incredible Science • Inspirational People • Astounding Places



@STFC_Mattias



Principle 1

The Science & Technology Facilities Council is one of Europe's largest research organisations. We enable the UK's natural sciences, computing, and engineering communities to continue their world-leading research by working with universities, national laboratories, scientific facilities, and regional campuses, in the UK and abroad.

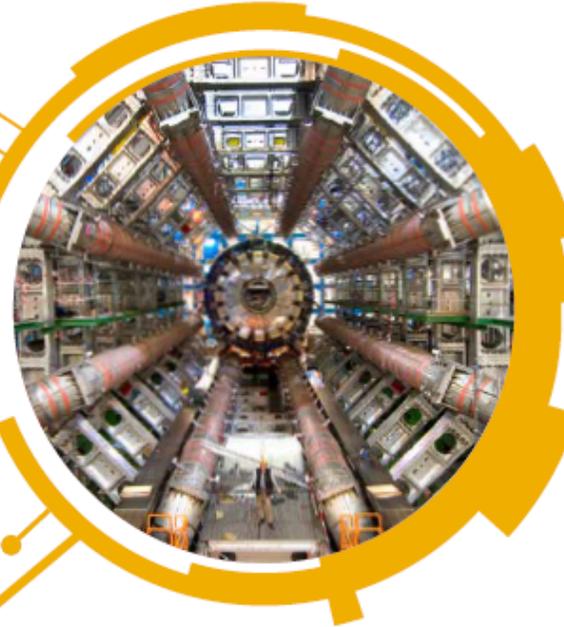
Public engagement with science, technology, engineering, and mathematics (STEM) has always been important to us. We love to talk about our work with the public – sharing the curiosity, excitement, and ambition that drives us to discover and understand new things, and develop technologies that improve our lives.

We are funded by the UK public: listening, understanding and discussing their views of the impact of science and technology on our society is both our responsibility and our privilege.

Contacts

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Principle 1

Our vision is of a society that values and participates in scientific endeavour

Our science is incredible. From the infinitesimally small world of sub-atomic structure to the inconceivably vast scale of cosmological phenomena, STFC's scientists and engineers are tackling big questions that we know attract people to science as children, and keep them asking questions throughout their lives. What's in outer space? How did the universe begin? What are we all made of? How does the world around us work?

Science and technology are in the public consciousness. Technology improves lives – it helps us communicate, it keeps us safe, and it makes us healthy. Contemporary science is shared on social media, debated on national news, published and discussed online, and is the inspiration for numerous popular and successful films, television shows, and documentaries.

We believe it is vital that society never stops talking about science and technology:

- To explain new discoveries and dispel misconceptions about how the world around us works.
- To explore, for example, the challenges we face regarding our environment, our food supply, and our energy systems in the future.
- To exemplify how science is actually done, and the power of scientific thinking to help teams and individuals create something amazing.

We want to make sure that our scientists and engineers, and our wider community of grant holders, universities, educators, communicators, and science enthusiasts, are part of these conversations.

Our mission is to use our stories, community and facilities as the basis of world-class public engagement that inspires and involves people with our science and technology

With information so freely available and quickly disseminated, public engagement with science is changing. It is easier than ever for people to speak directly with scientists and engineers, or learn about complex subjects when they want, how they want. We need to embrace these changes, and satisfy the demand and expectation from the public for clear, engaging, and accessible content of the highest quality possible.

We will use our outstanding science to inspire people to explore science and technology for themselves, to share their understanding with family and friends, and to consider the benefits of studying STEM in opening doors to a multitude of future careers. As an organisation that does science, we are fortunate enough to couple scientific content with two crucial strengths – our inspirational people, and our astounding facilities.



Public Engagement and STEM Skills

The UK faces a shortage of people that have the range of STEM skills and qualifications that the country needs in the future; many studies have warned about the future damage to our economy if we do not encourage more people to enter the careers that require this base of STEM understanding. STFC and the UK need talented people to keep us at the forefront of international science. Therefore, we want to inspire both girls and boys to be more likely to understand, study, or work in STEM.

We consider public engagement to be the vital first step in growing the UK's STEM talent pool. A scientifically literate population seeds ambition and interest in STEM careers. We help children, parents, and teachers understand why science is important, and that STEM subjects are a springboard to hundreds of different careers in the UK. Our own community demonstrates the diversity of routes into STEM careers – from work experience, apprenticeships, and vocational experience, alongside graduate or postgraduate qualifications and research. Thus, every aspect of our public engagement seeks not only to inspire the next generation as to the value of science, but also to show that STEM subjects open the door to a hugely rewarding future.



Behind all science and innovation lie stories of cooperation, perseverance, and sharing of ideas that are truly brought to life by the people involved. The stories of our engineers, technologists and scientists show that science and engineering involves teams of people drawn from all genders, ethnicities, and social backgrounds, working to solve problems and understand the unknown. Engaging with the public works both ways – researchers have their perspectives challenged, practices improved, and enthusiasm heightened by public engagement.

Speaking to people about science is one thing, but seeing it first-hand is another. STFC's labs and campuses in Harwell, Daresbury, and Edinburgh are unequalled in the UK, and give us a unique opportunity to let people experience the remarkable scale, ambition, and achievement of UK science. Experience tells us that the public wants to see it for themselves – we have welcomed tens of thousands of people, including thousands of school students and teachers, through the doors of our facilities in the past five years, and the feedback we receive is overwhelmingly positive.

STFC has a strong record in public engagement, so what will we do differently because of this strategy? We want a higher proportion of our audience to be people new to STFC science and technology, and students in late primary or early secondary school. To achieve this, we will work in partnership with others more than we ever have before. This takes effort, and might mean we deliver fewer activities ourselves, but will maximise the overall reach and impact of our public engagement.

Our mission is to inspire people using stories of our science and technology, to create a society that values scientific endeavour. We are excited to invite our community to work with us to make that vision a reality. To achieve that, our strategic focus will centre around five key aims for public engagement.

Principle 1

OUTREACH CAN BE INCLUDED IN REF IMPACT CASE STUDIES

A REF impact case study is a narrative which describes how research, conducted during a specific time at a named institution, resulted in a change, had an effect on or benefited culture, the economy, the environment, health, public policy, quality of life or society using qualitative and quantitative evidence. The impacts must have occurred during the REF census period.

The **general criteria** used to assess the impact of research in REF2014 were:

Reach: the spread or breadth of influence or effect on the relevant constituencies. Reach will not be assessed in purely geographic terms, nor in terms of absolute numbers of beneficiaries, but rather based on the spread or breadth to which the potential constituencies have been affected.

Significance: the intensity of the influence or effect.

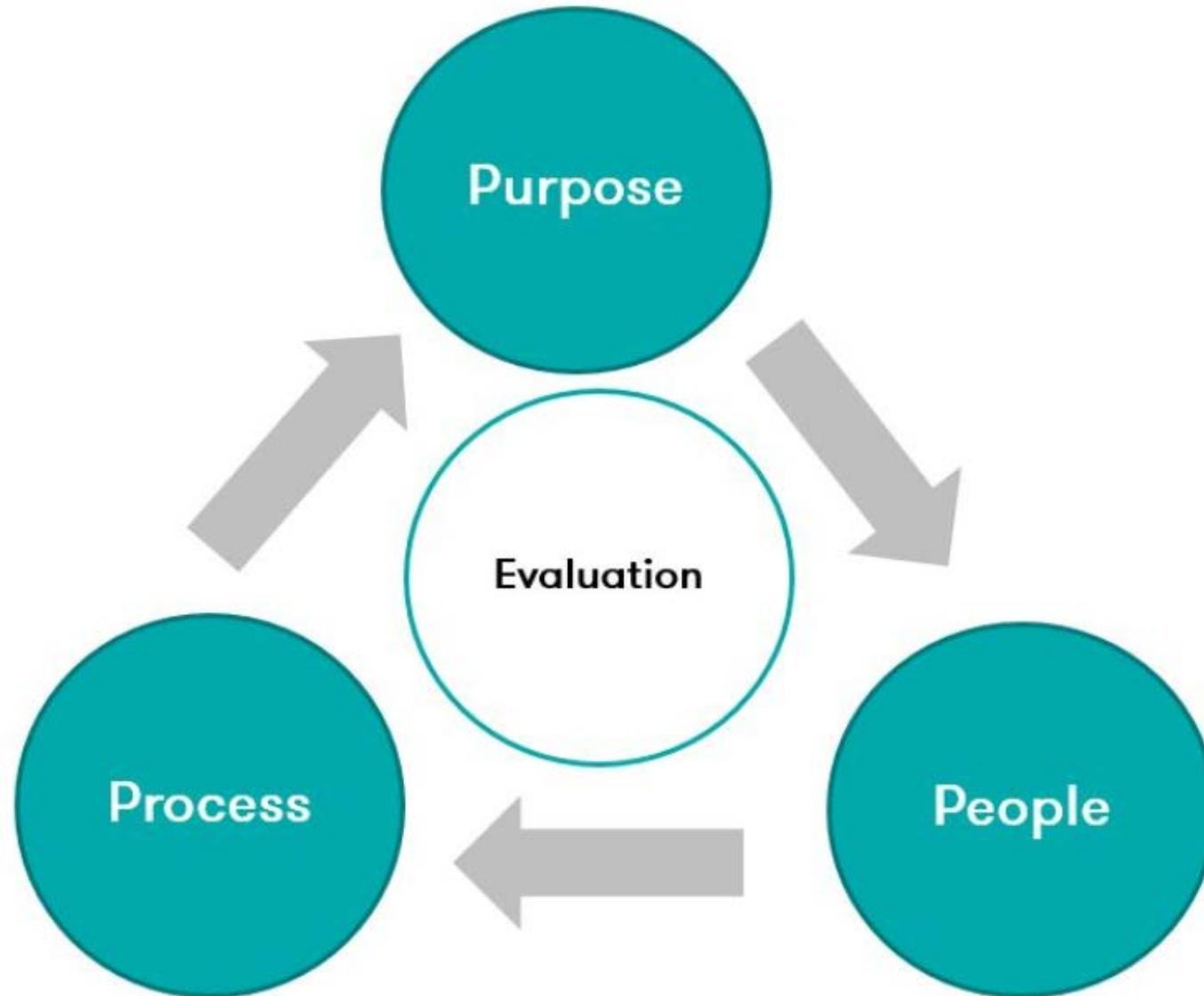
Impact has been considered a beneficial addition to the REF and will be worth 25% in the REF2021 assessment



WHY DO I DO PUBLIC OUTREACH?

- (1) I enjoy it! In my day-to-day job I spend a lot of time sitting in front of a computer coding. I enjoy getting out-and-about, interacting with different groups of people and (hopefully) inspiring other.
- (2) I believe it is worthwhile, maybe we can make a difference to school pupils or members of the public.
- (3) I hope I am developing transferable skills.
- (4) I hope I can help my university, raise its profile and maybe assist in recruitment.
- (5) I gain inspiration for my own research.
- (6) I become quite popular when the STFC consolidated grant is being written.

PRINCIPLE 2: PEOPLE



WHO ARE THE PUBLIC?

So who exactly are the public that universities are engaging with?

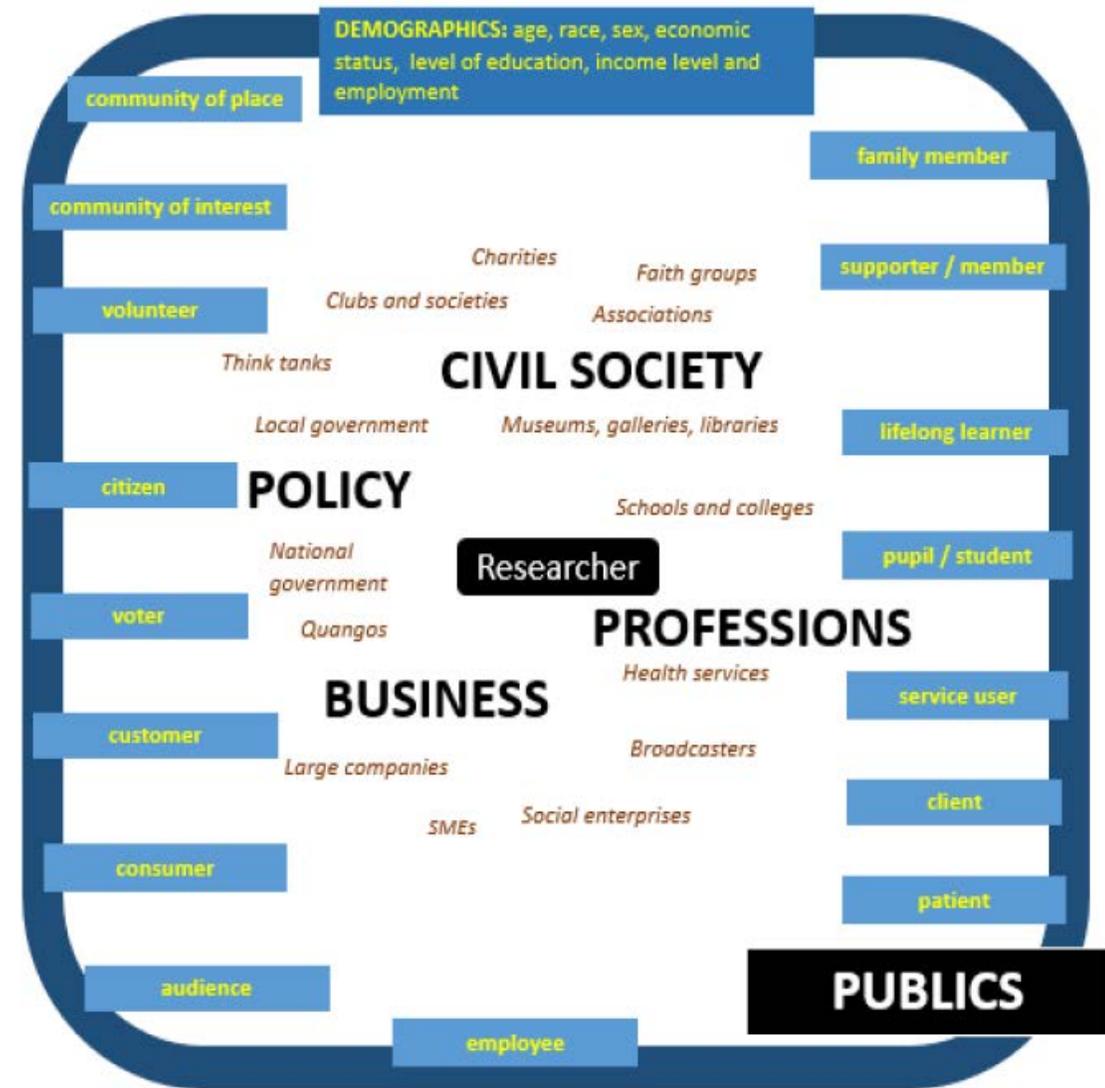
Everyone is a member of the public. However targeting the public as if they were an undifferentiated group tends not to be very effective. May help to use the term 'publics' instead to try to segment people based on some shared characteristics

A huge amount of work has been done on 'segmenting' the public – and to provide info on their interests and needs – and to develop techniques for building effective engagement with them. Very useful for market research, health and charity sector.

Public outreach in HEI may be lagging behind..

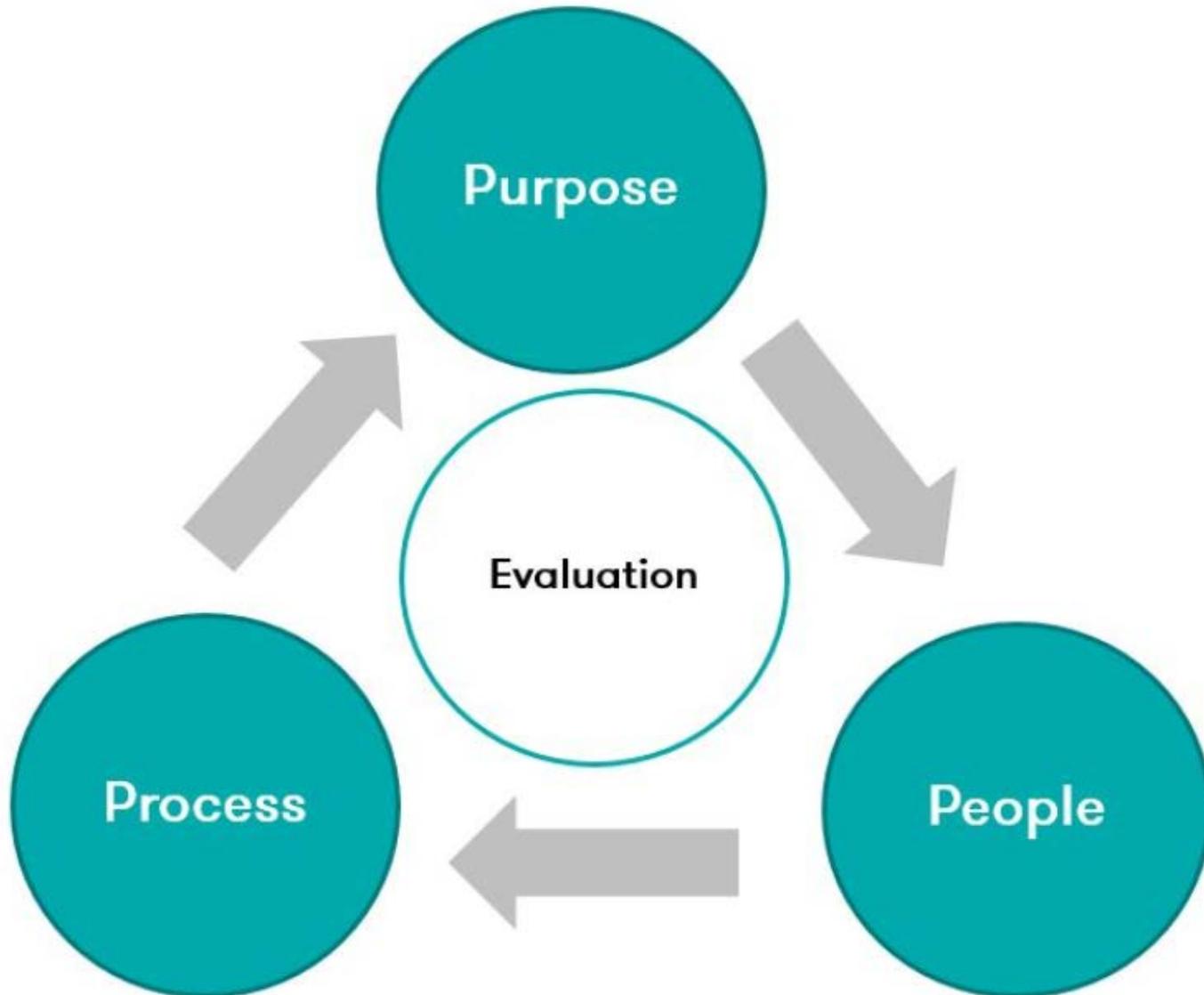
Principle 2

- The University of Bristol and the NCCPE reviewed public engagement in REF2014.
- They noted that many impact case studies talked about 'the public' in an undifferentiated way and said that more clarity and precision about who is engaged is important.
- They derived the following 'map' from the case studies.
- It articulated the world 'beyond academia' as a variety of spheres: **policy, professional practice, business and civil society.**
- In each of these spheres individual members of the public, and collection of people, play a variety of roles – as citizens, consumers, voters etc.
- Focussing on the active roles the public can play in the public sphere is helpful in providing more specificity about the nature of interaction between researchers and publics.



'In the next REF we should expect that case studies avoid the generic term 'the general public' and provide more differentiated identification on the publics engaged' NCCPE

PRINCIPLE 3: PROCESS



- Purpose: Why are you doing the engagement?
 - People: Who is involved in the project as participants, partners, or deliverers of the project? How have you considered their needs and interests in developing your approach?
 - Process: Is the process appropriate to the purpose and people you are engaging with?
 - Evaluation: Have you considered how to use evaluation to both inform your approach, and to assess its value?
- National Co-ordinating Centre for Public Engagement.

PROCESS

Lecture / Presentation

Broadcast

Event

Writing

Encounter

Websites

Performance

Exhibition

Exhibit

Workshop

Network

Social media

Collaboration

Consultation

Formal learning

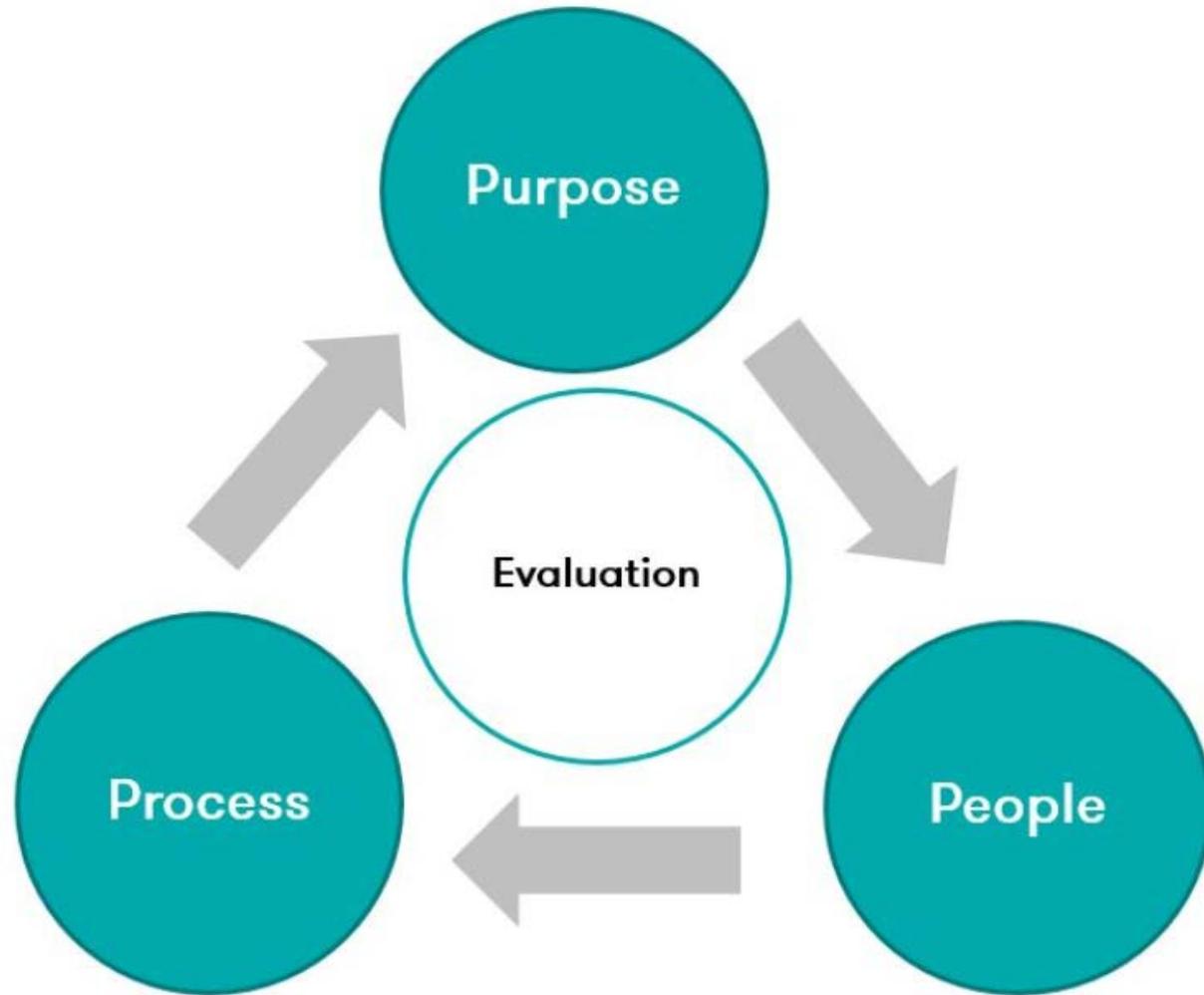
Citizen research

Collaborative research

Enquiry service

PRINCIPLE 4: EVALUATION

In my experience often the most difficult and neglected part of the project – arguably the most important.



PRINCIPLE 4: EVALUATION

Evaluation is a process of collecting evidence and reflection that will help you understand the dynamics and effect of your work, and help inform future projects or approaches.

Used correctly, evaluation is a valuable tool that enables you to learn from your experiences and to assess the impact of your work.

Benefits can include:

- **Assistance with planning.** Evaluation helps you focus on what you want to achieve, how you will achieve it and how you will know if you have been successful
- **Evidence of impact.** It can help measure the value and benefits of your activity and provides a record of your achievements (for you and your line manager/supervisor, funders and potentially for the REF)
- **Critical reflection.** Evaluation provides a tool for critical reflection for you and the people you collaborate with, and helps improve a project.
- **Accountability.** Evaluating can help to demonstrate whether your project is value for money which is important when reporting to funders
- **Learning.** Evaluation generates learning that can be shared with others and inform future activities

PRINCIPLE 4: EVALUATION

It is best to develop your evaluation plan at the beginning of the project – this will help you think through what you are trying to achieve and ensure you collect the relevant data from your project as you go.

You may choose to evaluate in-house or buy in some external expertise (apparently)

HOW TO EVALUATE

How to...

...evaluate public engagement projects and programmes

Guidance on how to evaluate your public engagement
programme

LOGIC MODELS

Working through your project using a logic model can be a very useful tool to inform your approach to the evaluation

- Current situation - A description of the situation you are trying to change
- Aims – what you hope to achieve
- Inputs – what you will contribute
- Activities – what you are going to do to achieve the aims
- Outputs – what you create
- Outcomes – what happens as a result
- Impacts – what is the long term effect
- Assumptions – that you are making in designing your approach
- External factors – that could influence the outcomes of your project

OUTPUTS, OUTCOMES AND IMPACTS

When planning an evaluation it is helpful to differentiate between outputs, outcomes and impact as these provide useful ways in which your work can contribute to change.

OUTPUTS – usually tangible project: e.g. online resources, events, exhibition, number of participants.

OUTCOMES – are the results of the activity e.g. increased understanding of the topic, enjoyment, inspiration and creativity, new experiences.

OUTCOMES ARE THE THINGS WE THINK NEED TO HAPPEN IN ORDER TO HAVE LONGER-TERM IMPACT

LONGER TERM IMPACTS: changes to how people think (e.g. increased knowledge or awareness), changes to what people do (e.g. study A level physics); changes in how things work (e.g. policies or behaviour).

Consider the overall questions your evaluation may address – particularly focussing on your aims, outputs, outcomes and impacts.

Once you have decided on the questions you want to ask, consider how you want to ask them

Methodology: Broadly speaking there are two main types of evaluation data you might collect: quantitative or qualitative

How to gather your data:

- 1) Graffiti walls:- great opportunity for feedback e.g what did you enjoy/learn
- 2) Quizzes: - keep it fun
- 3) Questionnaires: - don't make them too long
- 4) Postcards
- 5) Interviews

Data analysis

Reporting: Who is interested in your evaluation? You need to consider this when developing your evaluation plan.

The Planeterrella

In 2011 Alan Stocker and myself applied for an STFC Science in Society small award (~10 k) to purchase and present a planeterrella – a modern day reproduction of Birkeland's terrella experiment. A 1 year award.

(originally applied for a large award but was turned down – actually a blessing-in-disguise)

Objectives (SMART specific, measurable, achievable, results-focused, and time- bound)

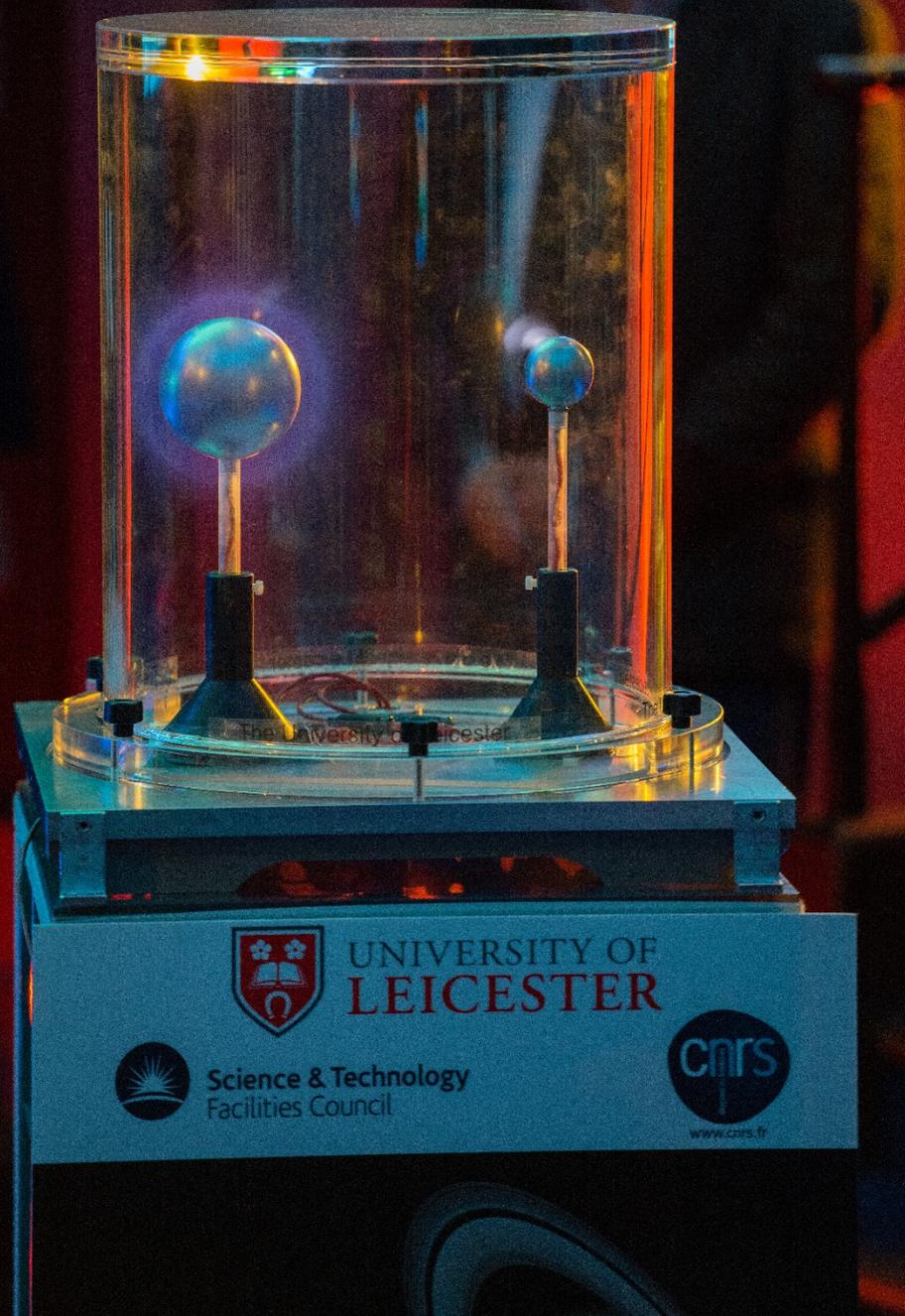
- 1) To purchase a planeterrella, a modernised reproduction of Birkeland's terrella.
- 2) To demonstrate the planeterrella during 'ten' auroral shows to held at the University of Leicester, local schools, colleges, community settings and the National Space Centre. The shows will be presented by scientists and engineers from the University of Leicester.
- 3) The total audience number to exceed 1000 during the project.
- 4) To forge strong links between scientists and engineers at the University of Leicester and local schools and colleges and the general public.
- 5) Our overall objective is to enthuse and inspire the general public in the wonders of solar system and space science

The Planeterrella

It is a vacuum experiment containing a tenuous plasma, and two spheres. Inside the smallest sphere is a powerful magnet and inside each sphere is an electrode. Applying a potential difference between the spheres results in auroral lights being created around the poles of the 'Earth'.

The first job we did was to buy the terrella from France and to get it working. This took many months and was dependent on the goodwill of our fantastic technicians (I had not included technician time in the grant proposal – big mistake).

We also developed an 'Auroral Show' powerpoint presentation

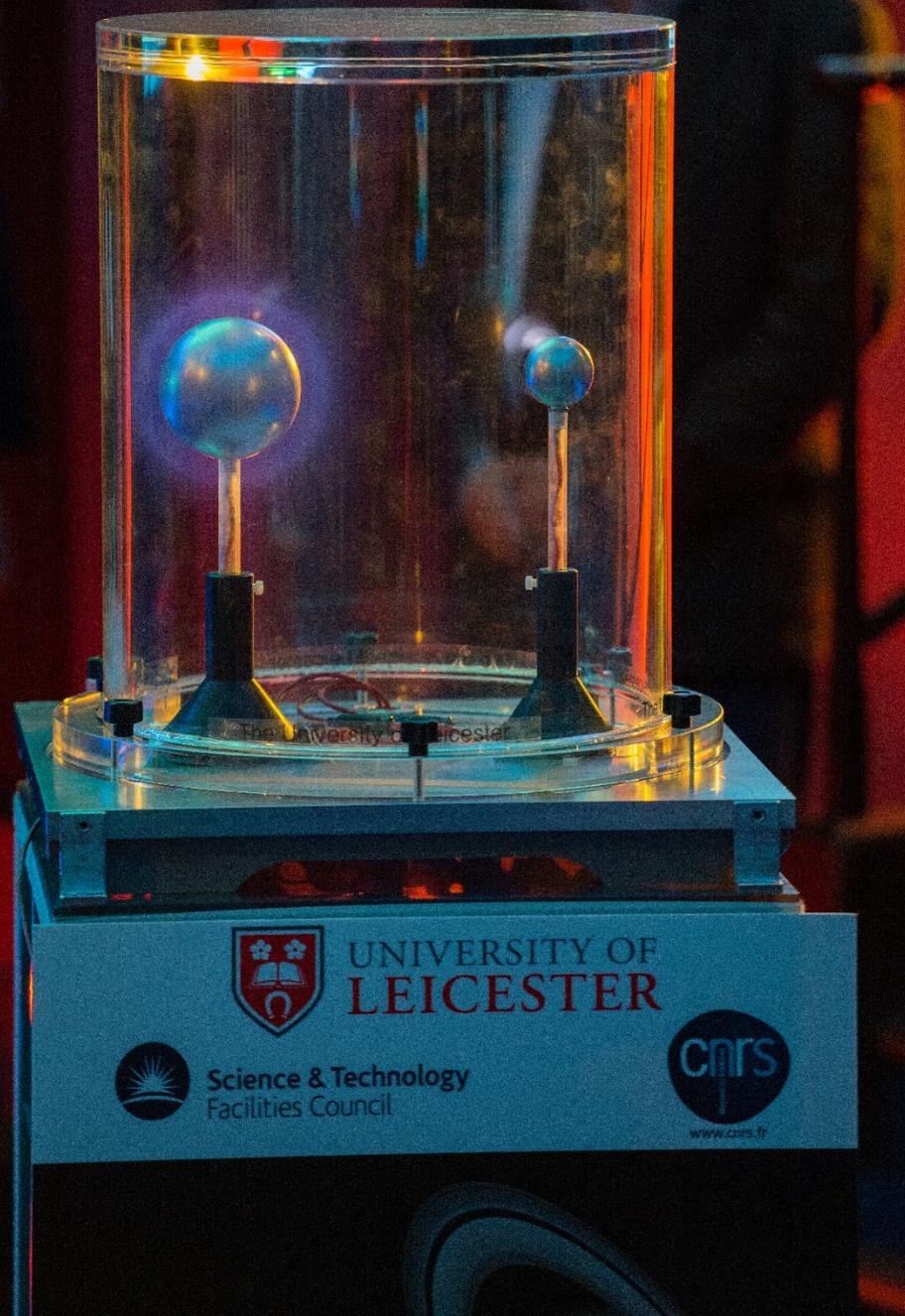


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Next we developed an 'Auroral Show' power-point presentation



Aurora Show

which is a powerpoint presentation introducing the planeterrella. The Auroral Show includes movies of the aurora, discusses the history of the planeterrella, and explains the science of the aurora. The slide show is differentiated for different audiences **and is presented by different people.**

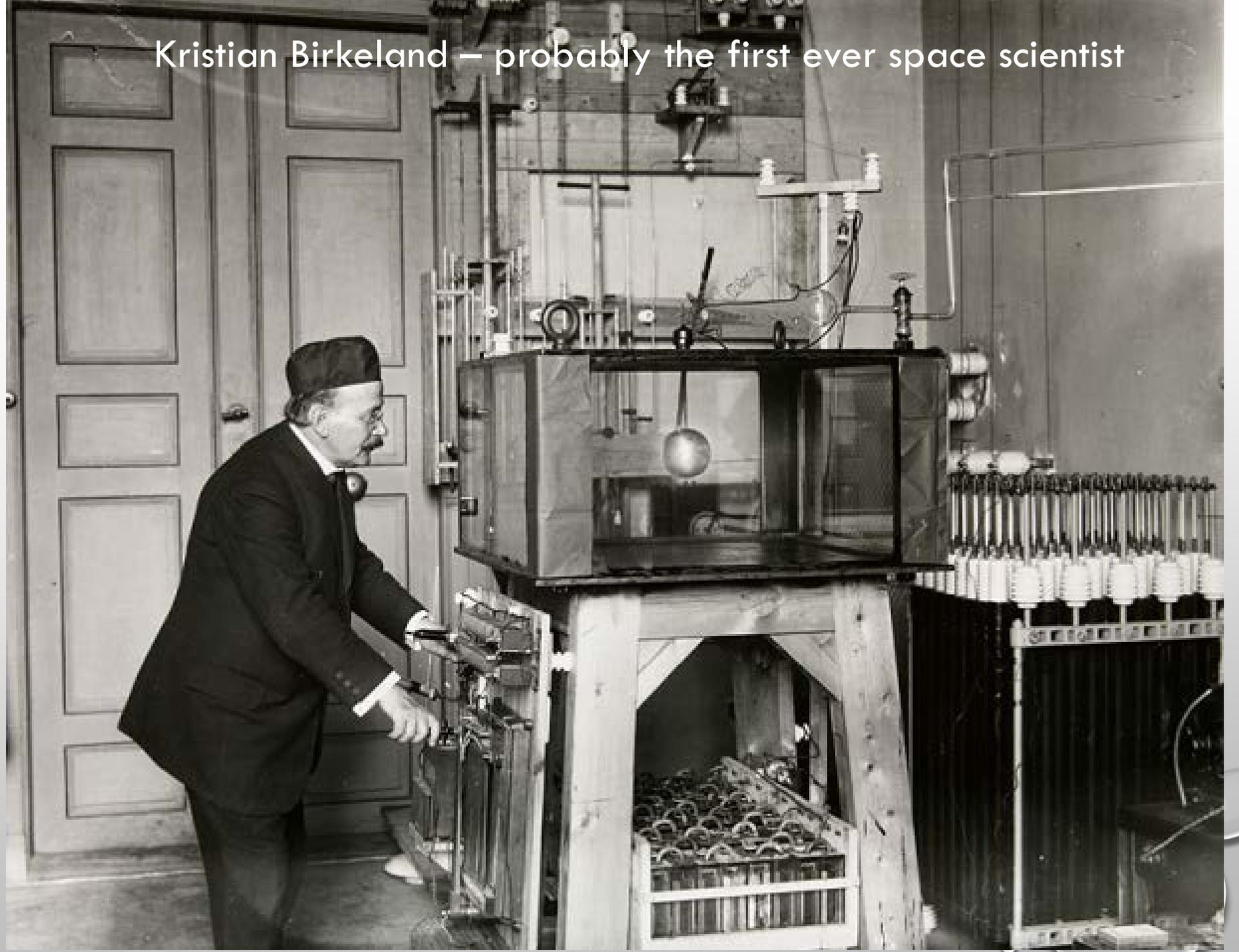
A photograph of the Aurora Borealis (Northern Lights) over a dark landscape. The aurora is visible as vibrant green and purple streaks in the night sky. The foreground shows a dark silhouette of trees and a body of water reflecting the light.

The Northern Lights on Earth and Other Planets

Gabby Provan, Ian Whittaker
and Jasmine Sandhu

Kristian Birkeland – probably the first ever space scientist

The human-element is very important.





So is a sense of daring and adventure

In 1899 Birkeland built a laboratory
in Northern Norway



Aurora Through the Ages

Roman Goddess of Dawn



16th century Germany



**Ancient Greek:
Aristotle's Fire**

Norse mythology: Bífrost, the
bridge to the Heavens

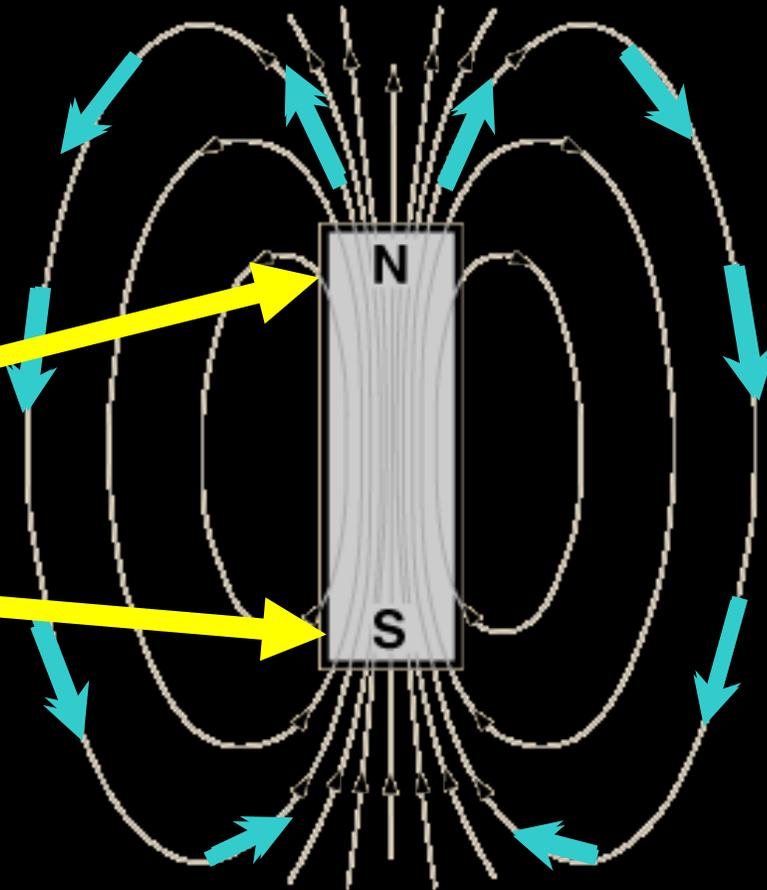
OLD TESTAMENT:
WHIRLWIND OF
FIRE

**Finnish Legend:
Arctic fox-fire**



Magnets Produce a Magnetic Field!

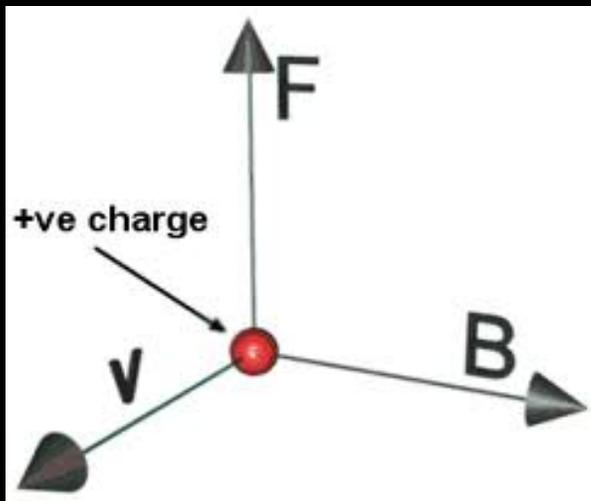
Magnets
have a
north and
a south
pole



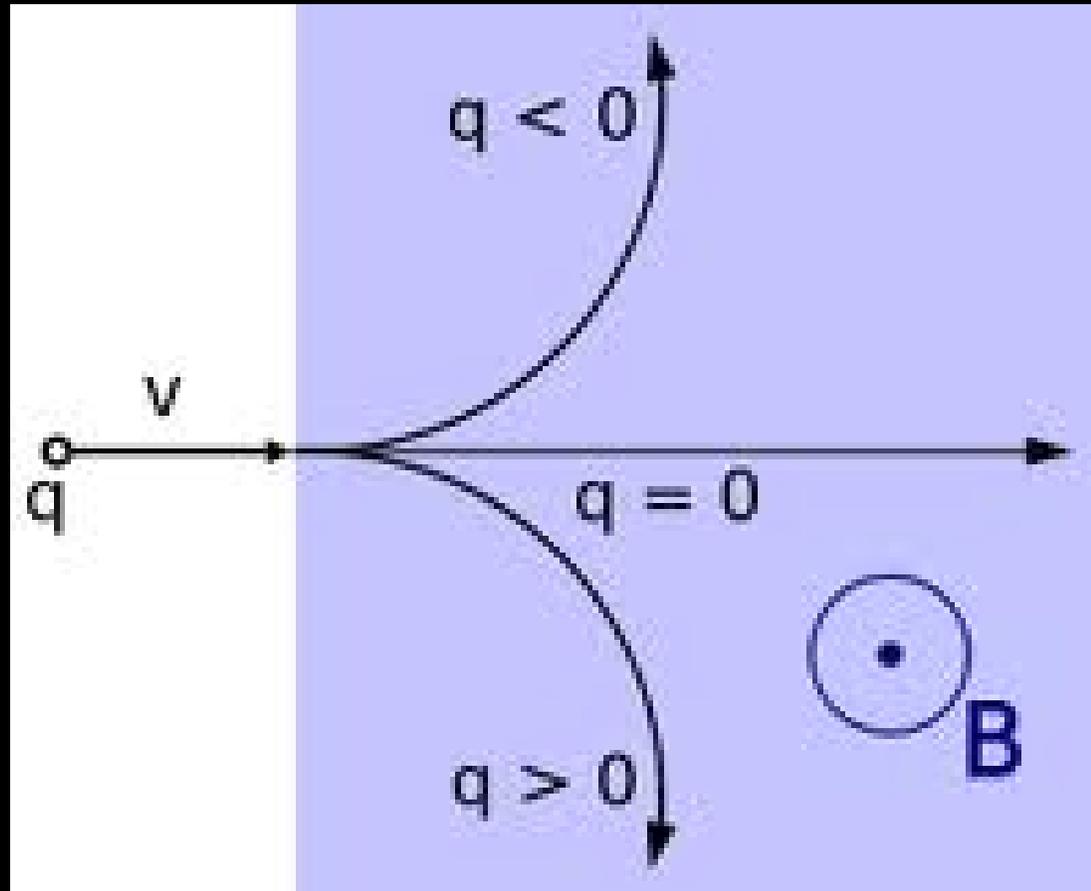
Magnets
have
invisible
lines of
magnetic
field that
flow from
north to
south

Lorentz force - motion of charged particles in an electric and magnetic field

$$\mathbf{F} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B})$$



If $E=0$





Dear Sir/Madam,

The Northern Lights are nature's very own beautiful and dynamic light show, captivating all who gaze upon them. Since the beginning of time, people have tried to understand what causes the aurorae, resulting in a myriad of myths and legends. But it was only a hundred year ago, when Norwegian physicist Kristian Birkeland led a daring expedition to the top of an arctic mountain, that scientists realised that the aurorae are created by charged particles from the Sun travelling along the Earth's magnetic field lines and exciting our atmosphere.

Back in his laboratory in Oslo, Birkeland proved his hypothesis to the world with a famous experiment where he created auroral light around magnetic spheres inside a small vacuum chamber. The University of Leicester has a modern day reproduction of this experiment, called the Planeterrella, and would like to give the pupils at your school the chance to see the auroral lights themselves. The Planeterrella consists of a small vacuum chamber within which we re-create auroral lights. The dimensions of the vacuum chamber are 50 cm in width and 60 cm in height. The planeterrella is best exhibited in a darkened room.

The Planeterrella is available for free demonstrations at your school. Scientists from the University of Leicester will bring the Planeterrella to your school, and exhibit it together with a presentation on auroral lights, and Birkeland's heroic expedition to the arctic. The complexity and natural beauty of the aurora has inspired many literary and artistic works and can easily form the basis of a cross curriculum project spanning science, literacy, art and design technology. Identical planeterrellas have won international public outreach awards and ours will be presented at the Royal Society Summer Exhibit in July.

To read more about the Planeterrella please see: <http://planeterrella.obs.ujf-grenoble.fr/>.
For further information or to book the Planeterrella, please contact Dr Gabby Provan.

Yours Sincerely, *Gabby Provan*

We then wrote to a lot of schools saying we were willing to present the planeterrella and also set up a web page. We also contacted STEMNET and the IOP who promoted the planeterrella widely



Department of Physics and Astronomy

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Physics And Astronomy

Postgraduate Study

Research

People

Place

Reviews and Awards

Existing Staff and Students

Work Opportunities

Public Outreach

→ Lectures for Schools and Colleges

→ Space School UK

→ Space School Booking

→ The Rockets Pages

→ Leicester Physics Centre

→ The Planeterrella: an amazing polar light simulator

→ University of Leicester physicists bring the aurora to schools

The Planeterrella: an amazing polar light simulator



Logo courtesy of CNRS and University Joseph Fourier, Grenoble.

Introduction

The Northern Lights are nature's very own beautiful and dynamic light show, captivating all who gaze upon them. Since the beginning of time, people have tried to understand what causes the aurorae, resulting in a myriad of myths and legends. But it was only a hundred year ago, when Norwegian physicist Kristian Birkeland led a daring expedition to the top of an arctic mountain, that scientists realised that the aurorae are created by charged particles from the Sun travelling along the Earth's magnetic field lines and exciting our atmosphere. Back in his laboratory in Oslo, Birkeland proved his hypothesis to the world with a famous experiment where he created auroral light around magnetic spheres inside a small vacuum chamber.

The University of Leicester has a modern day reproduction of this experiment, called the Planeterrella, and would like to give the pupils at your school the chance to see the auroral lights themselves. The Planeterrella consists of a small vacuum chamber within which we recreate auroral lights around magnetic spheres, and visualise cosmic phenomena.

EVALUATION

100% of the pupils either 'strongly agreed' or 'agreed' with the statement 'I found the presentation interesting'. 100% either 'strongly agreed' or 'agreed' with the statement 'Science affects everyday life' . 75% agreed with the statement 'I would like to find out more about careers in science'



Planeterrella Questionnaire

We hope you enjoyed the Planeterrella. Please could you answer the following questions:

- I found the presentation interesting:	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
- I found the science easy to understand:	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
- Science and engineering affect our everyday lives:	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
- I would like to find out more about careers in science:	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
- The scientist was easy to understand:	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A

Any further comments or suggestions:

Final Report and Evaluation for a STFC Science in Society Award

2. Achieving Objectives

original objectives are presented in red and our achievements in black.

1) To purchase a planeterrella, a modernised reproduction of Birkeland's terrella.

The planeterrella was purchased from France and delivered to the University of Leicester. Additional resources, eg the vacuum pump, was purchased in the UK and the experiment was assembled at the University of Leicester by the technical staff.

2) To demonstrate the planeterrella during 'ten' auroral shows to held at the University of Leicester, local schools, colleges, community settings and the National Space Centre. The shows will be presented by scientists and engineers from the University of Leicester.

The planeterrella has been presented to pupils at the IOP plasma conference, at ten schools in the midlands, at three university open days, to the university of the third age and at the Royal Society Summer Exhibition (RSSE). The planeterrella was presented as part of 'auroral shows' incorporating a mulii-media presentation on the aurora presented by a scientists and/or engineers.

3) The total audience number to exceed 1000 during the project.

The visitor number to the RSSE was ~13700. Approximately 1000 pupils observed the planeterrella during school visits, and another 150 at university open days. The planeterrella was also exhibited to a further ~100 visitors from the University of the Third Age. So the total audience number was ~15000

4) To forge strong links between scientists and engineers at the University of Leicester and local schools and colleges and the general public.

We contacted STEMNET who helped advertise the planeterrella widely, as did the IOP. We also wrote letters to local schools (see appendix). Scientists and engineers from the University of Leicester visited a number of schools and institutions, and these collaborations are on-going. The planeterrella is clearly becoming known locally, and we have been invited to demonstrate the planeterrella at a number of schools and youth groups this autumn. We have also been asked to provide science posters for classrooms and further advice on science materials.

5) Our overall objective is to enthuse and inspire the general public in the wonders of solar system and space science

We interviewed a focus group of pupils at one school. Of the respondents, 100% of the pupils either 'strongly agreed' or 'agreed' with the statement 'I found the presentation interesting', 100% either 'strongly agreed' or 'agreed' with the statement 'Science affects everyday life'

75% agreed with the statement 'I would like to find out more about careers in science'

Over the course of the years I applied for and won three more public outreach grants:

- 1) An IOP School Link Scheme – which paid the expenses for students to run 10 additional Auroral Show'
- 2) A second STFC Science in Society Small Award - to produce lessons packs which allowed the planeterrella to be presented within the context of the National Curriculum. These lessons packed were presented by teachers. Also paid for PhD students to present the planeterrella.
- 3) A third STFC Science in Society Small Award – to present the planeterrella at the Cheltenham Science Festival and at the British Science Festival

NATIONAL CURRICULUM AND SPACE LESSON PACKS USED AS A MEANS TO DIFFERENTIATE PUPILS.



Final Report and Evaluation for a STFC Public Engagement Award

1. Project Details

Project Title	The Planeterra – Space lessons packs	STFC Ref. ST/3501402/1
Principal Applicant	Gabrielle Provan	Institution University of Leicester
Start Date	01.12.2011	Finish Date 28.02.2014 (extended)

2. Achieving Objectives

Please list the original objectives stated in your application and, against each one comment on how they were achieved. If any of the objectives changed or were not achieved please state why.

This award commenced on 01.12.2011. Below is a list of our original aims (in italics) and how we have met these aims (in bold)

The main aims of this proposal were

- 1) To produce four lesson packs each of which will support a one hour Planeterra lesson for key stages 2 to 5. The lesson packs will aim to teach the Planeterra within the context of the National Curriculum.*
Two teachers were commissioned and produced lesson packs for key stages 2 to 5. The lesson packs showed gave the teacher additional information regarding the planeterra, the science behind the planeterra and how this could be taught within the context of the national curriculum.
- 2) Each lesson pack to contain a detailed lesson plan.*

They do

- 3) To develop additional resources such as a poster on auroral science, hand-outs and quizzes.*

These resources were developed and included in each lesson pack.

- 4) Each lesson pack to contain additional equipment e.g. magnets and compasses to facilitate the teaching of the lesson*

Additional equipment was purchased, but in order to minimize expense we only purchased one set that could be shared between the lesson packs.

- 5) Each lesson plan will contain a guide to teachers which can be sent to the school prior to the visit.*

They do

- 6) To employ a PhD student or recent graduate to assist in presenting the Planeterra lessons.*

The grant has provided funding to employ at least three different graduates to assist in present the Planeterra.

- 7) To present two Planeterra lessons per month (on average), reaching a total of 36 schools during the course of the project.*

- 8) The total audience number to reach 1000 during the project.*

During the course of the project the Planeterra visited at least 21 schools, which is slightly below the 36 schools anticipated. However, the total audience number for these 21 schools was 1500 which was ~50 % higher than the target audience number. Further the Planeterra has been demonstrated extensively both locally (for example local scout groups and amateur astronomy societies), nationally (The British Science Festival and the Cheltenham Science Festival) and on national television with Brian Cox and Dara O'Briain. Please see below for further discussion on audience numbers

- 9) To perform a thorough and ongoing monitoring and evaluation of the Planeterra lessons, modifying the lessons in response to the evaluation if need be.*

There has not been the resources to perform a thorough analysis of the Space Lesson packs, so focused questionnaires were presented to pupils at one school (see below). 100% of the pupils either 'strongly agreed' or 'agreed' with the statement 'I found the presentation interesting'

- 10) Planeterra lesson of consistently high standard presented by a number of scientists and engineers.*

The Space Lesson Packs several graduates to be trained to present Planeterra lesson of a consistently high standard.

KS4 LESSON OBJECTIVES

WE WILL ANSWER THE FOLLOWING QUESTIONS:

WHAT DOES THE MAGNETIC FIELD OF THE EARTH LOOK LIKE?

WHAT IS AURORA AND WHERE DOES IT FORM?

WHAT DOES THE AURORA LOOKS LIKE (COLOURS AND SHAPES)?

WHAT CAUSES THE AURORA?

WHY IS UNDERSTANDING THE AURORA IMPORTANT TO US?

HOW CAN WE VIEW AURORA IN THE CLASSROOM?

PROCESSES – THE PLANETERRELLA

Lecture / Presentation

Broadcast

Event

Writing

Encounter

Websites

Performance

Exhibition

Exhibit

Workshop

Network

Social media

Collaboration

Consultation

Formal learning

Citizen research

Collaborative research

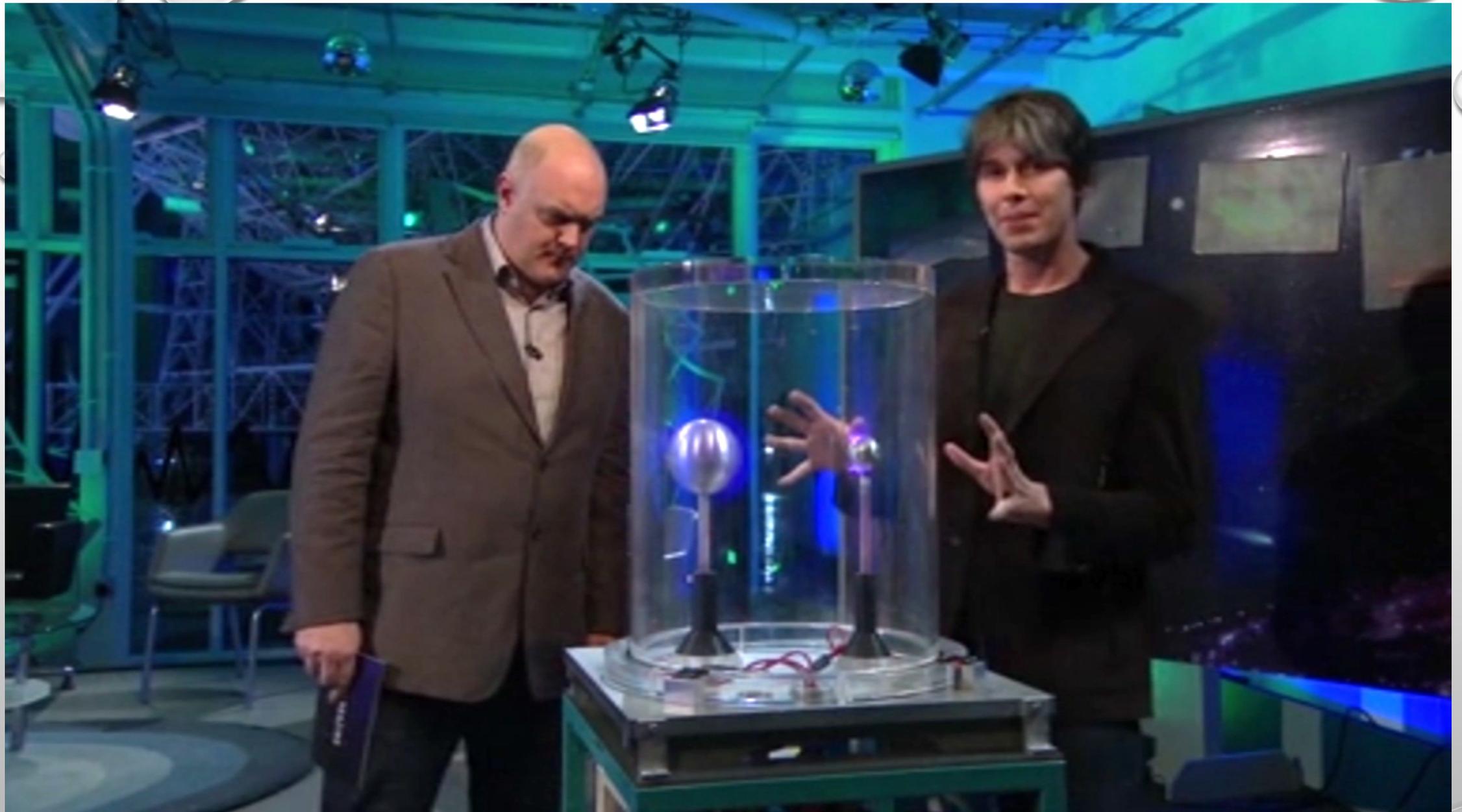
Enquiry service

Planeterrella Visitor Stats 2011-2018

At least 30 local school, in excess of 2500 students engaged with face-face
Royal Society Summer Exhibition 2011 - total visitor number ~14,000
Royal Institution Christmas Lecture 2015 – 430 in lecture theatre + broadcast live
Filmed for QI, 'Forces of Nature' documentary with Brian Cox and The One show
Cheltenham Science Festival and British Science Festival in Aberdeen (43,000 visitors)
IOP plasma conference and MOP conference in Sweden
University of the Third Age
VALUES – for people with learning difficulties
Woodcraft Folk, Scout Groups and cadets
Stargazing Live @ Nottingham and at Leicester ~4000 people
Amateur Astronomy Associations
Regional Libraries
Presented to Chris Hadfield
Space Late at the National Space Centre and Bradford National Science Centre
Lots of University Open Days
Currently at the Kielder Observatory







LOTS OF VERY HIGH PROFILE PUBLIC OUTREACH BEING DONE AT LEICESTER, SUZIE IMBER WON 'ASTRONAUTS' IN 2017.

A promotional image for the BBC Two TV show 'Astronauts'. The image features eleven cast members standing in a line on a dark surface, wearing bright blue jumpsuits. They are set against a background of a cloudy sky and a green field. The text 'ASTRONAUTS' is written in large, white, spaced-out capital letters at the top, with a horizontal line underneath. Below this, the text 'DO YOU HAVE WHAT IT TAKES?' is written in smaller, white, spaced-out capital letters. Underneath that, 'EPISODE 1 - SUNDAY 20th AUGUST at 9PM' is written in white. In the bottom left corner, the 'BBC Studios' logo is visible. In the bottom right corner, the 'BBC TWO' logo is visible. At the bottom center, the website 'www.bbc.co.uk/astronauts' and the hashtag '#astronauts' are displayed.

ASTRONAUTS

DO YOU HAVE WHAT IT TAKES?

EPISODE 1 - SUNDAY 20th AUGUST at 9PM

BBC Studios

www.bbc.co.uk/astronauts #astronauts

BBC TWO

AND STARTED A WHIRLWIND OUTREACH TOUR



Visits to over 25,000 primary and secondary school children over an 8 month period

Television and radio interviews, museum exhibits, podcasts and blogs

A new audience of tens of thousands at the GREAT festival of innovation, science and music festivals (Latitude, Bluedot, Gravity Fields, New Scientist Live)

Community engagement through British Science Week, and strategic partnerships with National Space Centre/Academy, Leicester City Football Club, Virgin Galactic

Public Engagement



UNIVERSITY OF
LEICESTER



LAUNCH YOURSELF

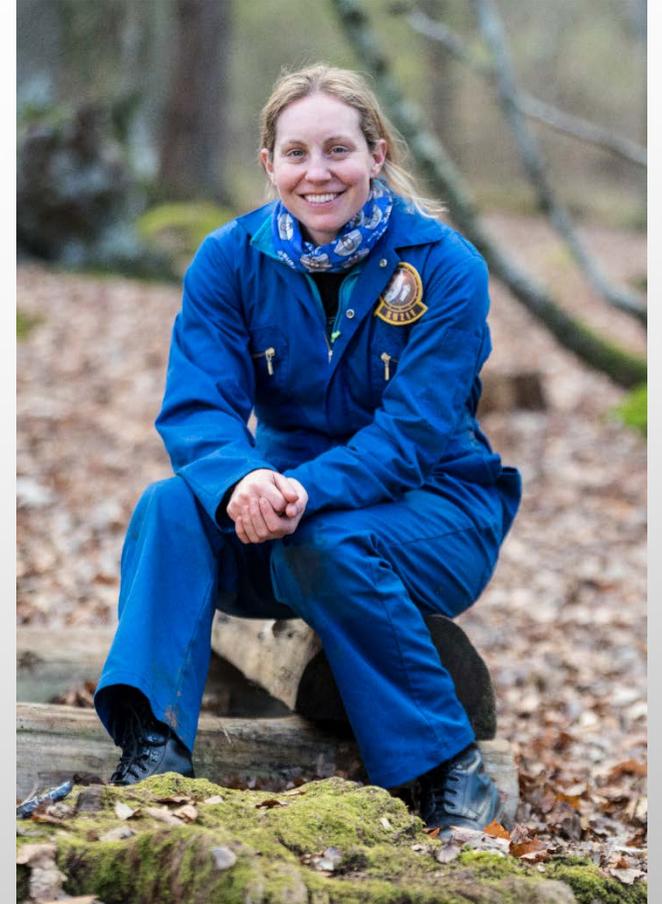
BEHIND THE SCENES



UNIVERSITY OF
LEICESTER

Issues faced

- Does the University value outreach?
- Can I continue to be a scientist and do public engagement?
- What is the attitude of my line manager?
- How to deal with the influx of requests?
- Should I have requested a reduced teaching load? If I had, would that request have been granted?
- What do the University want from me? How can I fund these activities?





STFC FUNDING OPPORTUNITIES



Public Engagement

Home / Public engagement / Public Engagement Grants

Public Engagement Grants

Our mission is to use STFC science & technology as the basis of inspiring public engagement. The STFC community plays a vital role in helping us reach new audiences: our grant programmes support high quality public engagement across the country, and build community networks and partnerships to help raise standards of engagement.



STFC funding opportunities

What are my options for engagement funding from STFC?



Planning an application

How do you prepare a high-quality application to STFC?



Evaluating your engagement

Learn about STFC's expectations of evaluation

Latest News

August 13, 2018
Inspiring, artistic and quirky photos get the judges' and public approval

August 9, 2018
Call on "UK-India Agricultural Data: Enhancement by Integration, Interpretation and Reusability" coming soon

August 7, 2018
New materials could make batteries charge faster

In this section

Planning an application

Evaluating your engagement

STFC Public Engagement funding

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Public Engagement

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STFC Public Engagement funding

We offer a range of grant schemes that are designed to allow our community to meet the aims of our public engagement strategy.



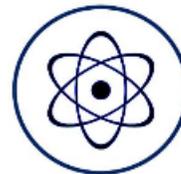
Leadership Fellows in Public Engagement

Increasing the excellence of public engagement in the STFC community.



Public Engagement Spark Awards

Delivering new engagement activities and testing fresh approaches with audiences.



Public Engagement Nucleus Awards

Building engagement networks and delivering national programmes of engagement.



Public Engagement Legacy Awards

Supporting our most successful programmes to grow and evolve over time.



Public Engagement Reaction Awards

Quickly responding to unexpected and engaging scientific developments.



School Grants Scheme

Promoting physics & engineering in schools & colleges, in partnership with the IOP and IET.

Latest News

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IMPACT OF PUBLIC ENGAGEMENT

Trends in attitudes to science and public engagement with science

BRIEFING PAPER

National Forum for Public Engagement with STEM

Extract from National Forum Response to Science Communication Enquiry 2017

The trends in attitudes to science, and public engagement with science

1. Much has changed over the last 15 years, since the publication of the **Third Report of the Select Committee on Science and Technology**ⁱ in 2000, which identified that: *“Society's relationship with science is in a critical phase. Public confidence in scientific advice to Government has been rocked by BSE; and many people are uneasy about the rapid advance of areas such as biotechnology and IT. This crisis of confidence is of great importance both to British society and to British science”*. Following this report, a range of interventions were made to address the potential breakdown of trust and understanding, including the establishment of the **Science Media Centre**ⁱⁱ and the **Sciencewise** expert resource centreⁱⁱⁱ; the **Factors Affecting Science Communication** research in 2006; the **Concordat for Engaging the Public with Research** in 2011^{iv}; the **BIS Charter for Science and Society** in 2014^v; and the various investments to secure strategic support for PE in universities, led by **National Coordinating Centre for Public Engagement**^{vi} (2008).

2. So what do we know about how public attitudes to science have changed over this period? **The Public Attitudes to Science (PAS) 2014 survey^{vii}** highlights the enthusiasm of the UK public about science, and how attitudes to science in the UK have become increasingly positive over a longer period of time, with 55% in 2014 agreeing that the benefits outweigh the harmful effects, compared to 45% in 1988. PAS 2014 also shows how the public see science as beneficial to society, both in terms of economic growth and the value it brings to their lives, and therefore continue to support government funding of science. According to PAS 2014, Scientists have a **high degree of trust** from the UK public, with a marked difference in trust for those working for universities (90%) compared to those working for private companies (60%). However, Wellcome's 2015 Monitor data^{viii} paints a different picture: with respect to **medical research information**, '59% trust [university scientists] completely or a great deal'; cf. 32% and 29% for pharma scientists and industry scientists, respectively.
3. PAS 2014 reveals that The UK public overwhelmingly think it is important to know about science given the importance of it to their daily lives, but **more people (55%) 'do not feel informed', than 'feel informed' (45%) about science, scientific research and developments**. There is a considerable appetite for hearing more about science – **only 6% say they see and hear too much about science, while 51% think they see and hear too little**.

USEFUL WEB PAGES

<https://stfc.ukri.org/public-engagement> -STFC Public Engagement

[http:// www.publicengagement.ac.uk/](http://www.publicengagement.ac.uk/) - National Co-ordinating Centre for Public Engagement

<http://www.iop.org/about/grants/school/> - IOP