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 researchinschools.org



THE INSTITUTE
for RESEARCH
in Schools

IMPACT
REPORT
2017-18



OUR PEOPLE

Executive team



Becky Parker MBE,
Director Visiting Professor, School of Physics and Astronomy, Queen Mary, University of London, Physics teacher, Tapton School, Sheffield. Honorary Fellow of the Institute of Physics, awarded the Kavli Education Medal from the Royal Society in 2016.



Steve Greenwood,
Chief Executive Prior to joining IRIS Steve held positions as UK Managing Director for a major US corporate and CEO for the UK with a Franco-German global outsourcer, as well as being the Chair of Governors for a primary school.

Mike Grocott,
Head of Student Development

Dr Lizzie Rushton,
Director of Evaluation;
Safeguarding Officer

Laura Thomas,
Director of Education

Clare Turnbull,
Research Associate

Laura Tyzack,
Head of Administration and
Compliance; Date Protection
Officer

Trustees



Humphrey Battcock (Chair)
Member of Cambridge University Campaign Board, Director of Cambridge Innovation Capital, Panel member of the Competition and Market Authority



Ann Mroz
Editor and Digital Publishing Editor of the Times Educational Supplement



Professor Steven Rose
Professor of Plasma Physics, Imperial College, University of Oxford



Professor Dame Julia Goodfellow
Current President of the Royal Society of Biology; formerly Vice Chancellor, University of Kent



Professor Sir Leszek Borysiewicz
Current Chair of Cancer Research UK; formerly Vice Chancellor, University of Cambridge



Dr Jo Foster
Vice Principal Director of Nexus and Cornwall School of Maths and Science



Tim Edwards
Chair of Storm Therapeutics Ltd, Cambridge; Chair of Karus Therapeutics, Oxford; Director, Record PLC; Governor (former Chair) of Magdalen College School, Oxford. Previously, Governing Board member of InnovateUK.

OUR VISION

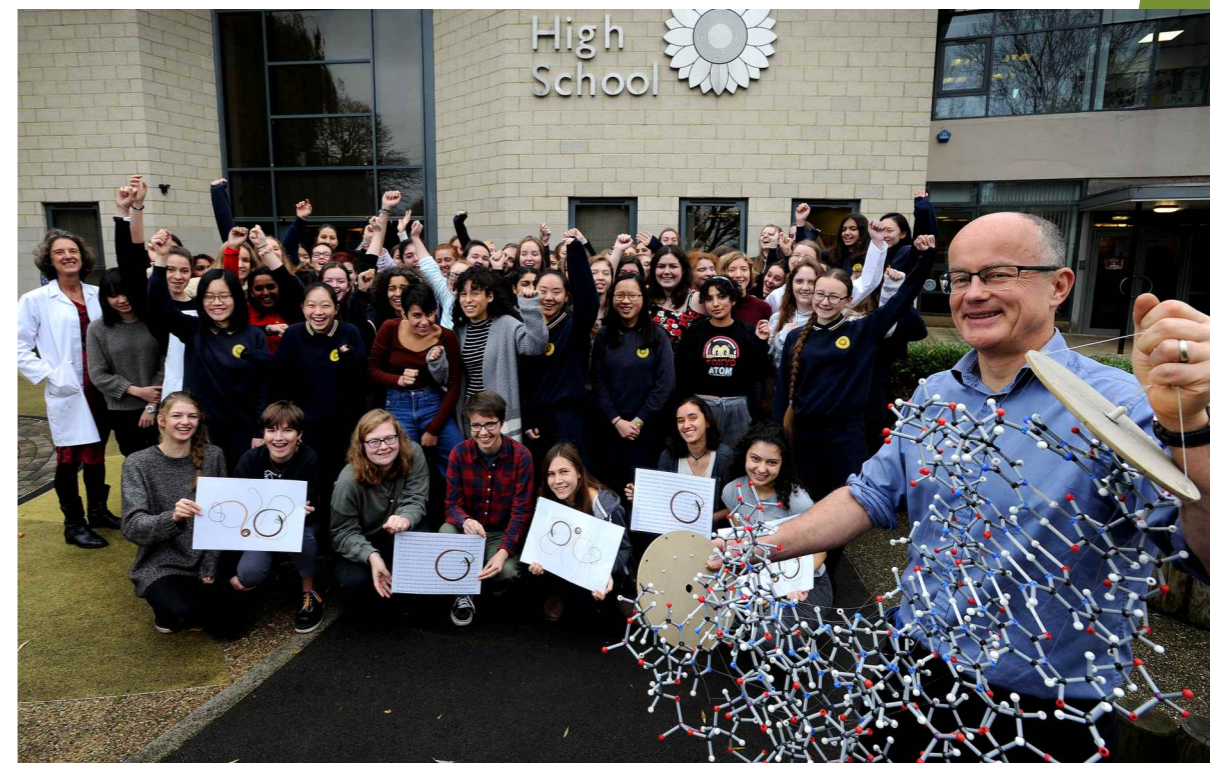


Photo: Oxford High School, Genome Decoder project

School students, teachers and technicians should have the opportunity to become valued and contributing members of the scientific community.

About The Institute for Research in Schools

We make cutting-edge research projects open to school students and their teachers. We do this by giving teachers and their students access to data, providing support and guidance to teachers and resources, and by lending out scientific research equipment.

Through IRIS, students and teachers build confidence in handling data and equipment and working in collaboration with an external partner. We make data available, and we provide support via webinars,

further resource materials and through our website and team.

The yearly cycle culminates in students presenting a paper or poster at one of our regional student research conferences across the country.

With this approach, the science community can become one where schools, colleges, universities and research institutes collaborate for the greater benefit of all.

Our aims

To give schools students opportunities to participate in cutting-edge challenges in Science Technology Engineering and Mathematics.

To provide teachers and technicians with the support they need to contribute to, and mentor, science research with their students.

To promote and facilitate sustained science collaborations between schools and universities.

OUR FIRST THREE YEARS: BEYOND EXPECTATIONS

2016
MAR.

Our formal launch at The Science Museum

2017
MAR.

Amazing Atmospheres project launch at the Eden Project, Cornwall

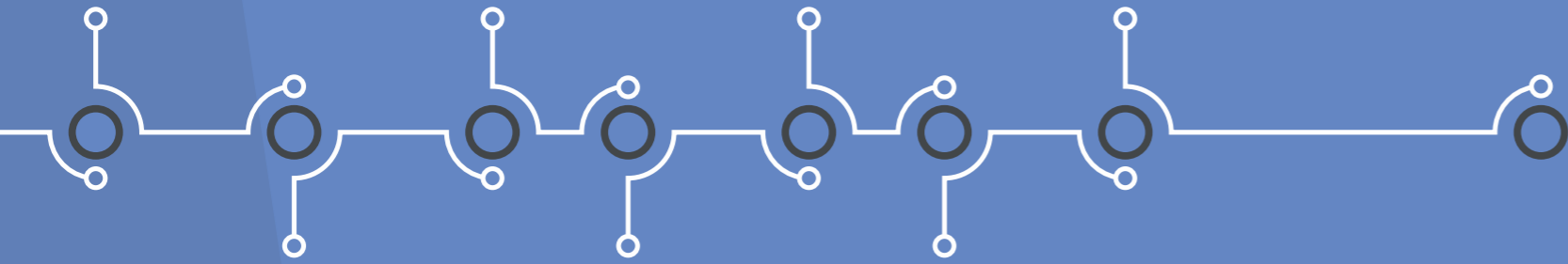
2017
SEPT.

Launch of the Genome Decoders project at the Wellcome Genome Campus, Cambridge. The event was featured on BBC Radio 4's World at One programme.

2018
MAR.

IRIS students attended a collaboration meeting at CERN that showcased research using Medipix chips in space. IRIS' LUCID and Timpix projects have access to the largest dataset from the Medipix chips.

IRIS' new project, MELT (Monitoring the Environment, Learning for Tomorrow) is launched.



Higgs Hunters launch, Royal Society Edinburgh with Peter Higgs

2016
SEPT.

IRIS' office relocated to the Wellcome Wolfson Building, Science Museum Campus, London. This move enables IRIS to have a presence in London.

2017
APR.

CERN@School symposium was held at the Rutherford Appleton Laboratory. 200 students from 18 schools presented their work.

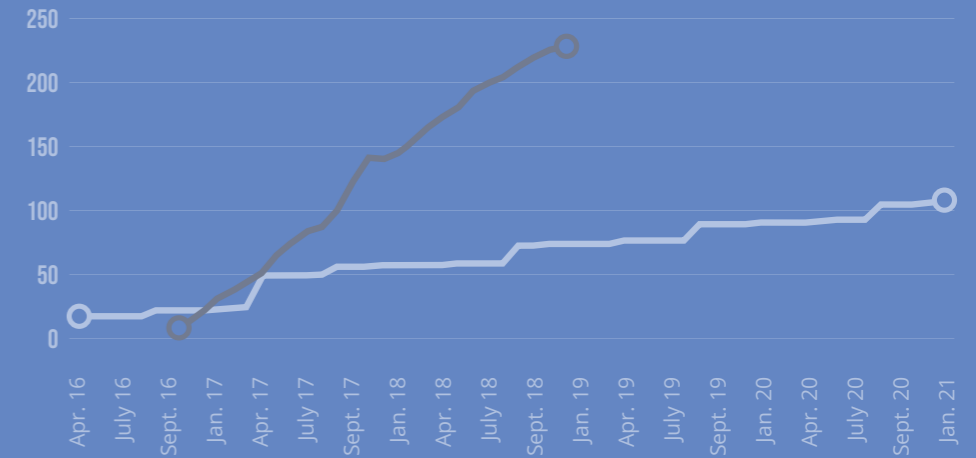
The Authentic Biology Symposium was hosted at Wellcome, with over 150 students from 15 schools.

2017
NOV.

THE JOURNEY SO FAR: 2016 - 2019

Number of partner schools:
what we achieved against original estimates

PROJECTED ●
ACTUAL ●



THE NEXT THREE YEARS

Priorities for 2019 - 2021

- Evaluate the impact of the hub-model vs schools not currently in IRIS hubs in areas including: effective school support systems, levels of student and teacher participation, number of projects, continuation in to STEM subjects and careers, teacher retention.
- Develop the 'teacher-scientist' concept through collaboration with the (science) education community e.g. keynote conference presentations and academic papers.
- Develop our conference provision beyond the annual single-disciplinary symposia to a programme of multi-disciplinary, regional conferences. This change will increase the numbers of students able to present.
- Build on the hub-model to create optimal ways of supporting schools to participate in further new projects and the creation of local school communities.
- Identify further opportunities for new authentic research projects for completion by students to supplement the existing portfolio.
- Provide advice and guidance to universities and research institutes on how to set up successful and sustainable research collaborations with schools. This will be achieved through the publication of a toolkit. This will contain a summary of the IRIS approach and resources that can be used when setting up and evaluating a research project.

2017-18: HOW WE PERFORMED

Our ambition

What we achieved

To recruit a further 30 school partners.

The number of schools wanting to take part, and actively undertaking research, has surpassed the target for year 5, with 154 enrolling by the end of March 2018. ✓

To develop our conference provision for students beyond the annual single disciplinary symposia, to a programme of multi-disciplinary regional conferences.

Building on the success of our CERN@School and Authentic Biology symposia we now have 5 multi-project conferences scheduled for Summer 2019 in venues ranging from Edinburgh to Exeter via York, London and Cambridge. ✓

To develop the 'teacher-scientist' concept through wider academic collaboration with the (science) education community.

Through participation in research projects, teachers create complex professional networks and develop a multifaceted sense of professional identity. Teachers identify as both science teachers and scientists and this is encapsulated as a transition in professional identity to 'teacher scientist'. ✓

To raise funds for four 'hubs', and to submit applications for continued funding for 2019-2020.

After initial seed-funding for a pilot from the Royal Commission for the Exhibition of 1851 to enable us to establish a hub in Sheffield, with support from Garfield Weston we have opened hubs on the South Coast and in Stirling. Sustainability is key and we continue to look for funding opportunities to enable us to continue these hubs beyond the initial period. ✗

To develop eight projects.

We have now created projects that cover physics, biology, chemistry and environmental science that also build mathematical and computer science skills. ✓

To evaluate the impact of the hub-model, versus lone IRIS school.

The framework has been developed and we are focused on an evaluation model to establish the impact of hubs on teachers and students versus schools not in a hub, or working on IRIS projects. ✗



'Not only will schools and universities benefit, but science itself will benefit'

Photo credit:
Genome Research Ltd

Lord Martin Rees – launch of IRIS 2016



OUR PROJECTS

Research opportunities: the day-to-day work of IRIS. This is real science, where the answer is not in the back of the text book.

Through systematic evaluation, we have refined our criteria for what makes a successful project.

In brief:

- Opportunities for experiments
- Scope for analysis of data
- Collaboration with a respected partner
- Impact on science.

GENOME DECODERS

Engages A-level science students with the topics of Neglected Tropical Diseases and Bioinformatics, through the curation of gene structures in the human whipworm (*Trichuris trichiura*) genome.

To date, the project has attracted more than 1,000 students from 52 schools across the UK, who are working alongside scientists to identify all 15,000 genes in the human whipworm genome.



MONITORING THE ENVIRONMENT LEARNING FOR TOMORROW

Offers students the chance to engage with, and begin to tackle, climate change.

For the Earth Observation element of the project, students analyse changes in the polar regions, and share findings with scientists at the Centre for Polar Observation and Modelling through using GIS software.

MELT also challenges schools to calculate their carbon footprint using a bespoke carbon calculator.



'We're building missions for the next generation of scientists - whether they are students still in school or students who are doing their university degrees.'

Prof. Gillian Wright

CERN@school

Highly sensitive radiation and particle detectors which make invisible ionising radiation visible are available on loan to schools.

This technology from the Medipix collaboration was first developed for particle detection at CERN and now has wide application in medical imaging fields and for radiation monitoring on the International Space Station.



TIMPIX

The Medipix technology that is part of the CERN@school project is on board the International Space Station.

Our partners at the University of Houston have made this data available to IRIS schools for analysis.



'The students are becoming the world experts on these genes, and are contributing directly to our understanding of a major global pathogen.'

Dr Julian Rayner, Director, Communicating Science at the Wellcome Genome Campus

1687 students registered to take part in Genome Decoders

IRIS is proud to work with schools of all types and contexts, with a broad range of levels of performance, providing unique opportunities for all.

OUR PROJECTS

continued...

HIGGS HUNTERS

Analysing data from the ATLAS experiment at the Large Hadron Collider at CERN.

Students presented their findings at a Higgs conference at Merton College and the proceedings are to be published. This project not only gave students the experience of real science, but also the opportunity to engage with working scientists and researchers.



WELL WORLD

Explores the impact of spending time in biodiverse environments on the physical and mental wellbeing of students.

This project has the potential to cover a wide range of disciplines from Psychology to Environmental Science.



IONIC LIQUIDS

Developed with Dr Robert Palgrave at University College London, this project allows students to design, synthesise and investigate their own ionic liquids.

By forming relationships with local universities for the spectroscopy analysis, students are also gaining an insight into studying chemistry at university and the career opportunities open to them.



COSMIC MINING

Students are collaborating with the UK Astronomy Technology Centre to identify potential targets for the James Webb Space Telescope.

They are analysing spectral data of stars from the Spitzer Space Telescope and in doing so are helping to build a database which will be of great use to the scientific community.



We're getting so much more value out of this data, thanks to the independent and creative ways in which these students are thinking about it. It's just fantastic.'

Professor Alan Barr - on the Higgs Hunters project

In the year to end of March 2018 IRIS staff saw **4000+** students and **1000+** teachers at over 170 different activities.

STUDENTS' PERSPECTIVES

Many students have given us their thoughts on what being involved in an IRIS project has done for them. Here is feedback from two.



I could see the the Genome De-coders project was literally frontline research, brand new stuff.

It was the opportunity that I couldn't pass up. So I had already signed up by the time I got home and told my mum.

Whatever the outcome of the genome research is, whether there is a cure developed or not, I will have contributed to the research journey of this disease.

Also, so far in education, teachers have been teaching me information and I have been learning it, but now I am at the front. I am teaching my teacher how to do it; I am the pioneer in the school; I am the expert. If

someone has a problem, I can usually help them.

I can absolutely say that this has helped my education, because with the A-level syllabus, when we got to the genetics topics, I already sort of knew so much of it. Triplets, codons, anti-codons and amino acids... I knew about these things already.

... given me an understanding of real science.

So, when my teacher is teaching about exons to the class, I can say, well why don't I just show you a real gene? I can just pop it up on the screen. I can find a random gene and talk you through it.

Our exams are about putting answers in boxes and getting the answer to a very narrow specification version of 'right'. But this research has given me an understanding of how real-world science is not like this. That is so valuable.

I have a sense that I am kind of a professional now. This has been a huge stepping stone for me. As to the future, I might do a PGCE after a degree in Bioinformatics or go into research and become a data scientist, or do both!

Laurence Pleuger, Year 12
Bedford School

What got me involved? It was the thought of contributing to something in the real world.

Up until the Genome De-coders project we had been learning, but not applying our knowledge. This changed with Genome De-coders.

To begin with, I didn't really understand much: just basic stuff about genes and DNA. Because we hadn't got to that stage in the syllabus. So, it was

all very overwhelming. But the practical work really helped me understand the key terms. For instance, 'exon' doesn't really mean much when you hear the word, but when you see all the exons and introns on the screen you understand it that bit more. The research makes something that is invisible to you, visible on the screen.

This project has given me an idea of what it might mean to be a scientist, which has made my dream of becoming a zoologist seem much more like

it can be a reality. And, now I have spoken to scientists, I am readier to share what I think, to be more confident. I am sure that this will help me in the future. Being able to say that I have done this and have sent something out to loads of people that people are going to work from, this is hugely inspiring for me as I go into Year 11.

Maria Sellars, Year 10
Joyce Frankland Academy
Newport, Essex



'It has made my dream of becoming a zoologist seem much more like it can become a reality.'



THE TEACHER-SCIENTIST

'When we present science to our students as ready-made, it's unrealistic. It also puts them off because they feel it's all been done before. But there is actually so much that we are exploring and discovering. Giving students an opportunity to be part of this is, for me, the biggest driver in being involved with IRIS.

At first, I was nervous about signing up. I do not have a research background and I was new to the school. But I need not have worried; Becky Parker and Steve Greenwood were always on hand. I really felt like they had my back.

Soon after getting going, our team spoke at the CERN@ schools conference. It was a big

step up for them. I too feel more confident now, having talked to other teachers about how to manage the groups and having seen what kind of research projects the students come up with.

I've got back in touch with real research.

The whole process has given the students the confidence to talk about Physics beyond the textbook. And for me, as a teacher, it's meant that I've got back in touch with real research and what's going on. It's been inspirational.

... give the students the freedom to work things out for themselves.

It's also been so important for me to learn to give the students the freedom to work things out for themselves. I have been amazed at how much the students can do when you sit back and let them.

We have not yet found the Baby Higgs, but this in itself is a valuable lesson. The students are learning that real science is about multiple failures and perseverance, as well as moments of discovery.'

Fern Goldsmith
Physics Teacher
Camden School for Girls

EVALUATION

Is the IRIS model effective? And what in particular are the benefits? Evaluating the impact of IRIS is an essential part of the process.

To date, we have focused on performance in four key areas:

- Student attainment
- Student destinations
- The experience of STEM teachers
- The efficiency of the hub model, i.e. cluster of IRIS schools.

Five distinctive features of IRIS' approach to evaluation have emerged over year 2017-2018:

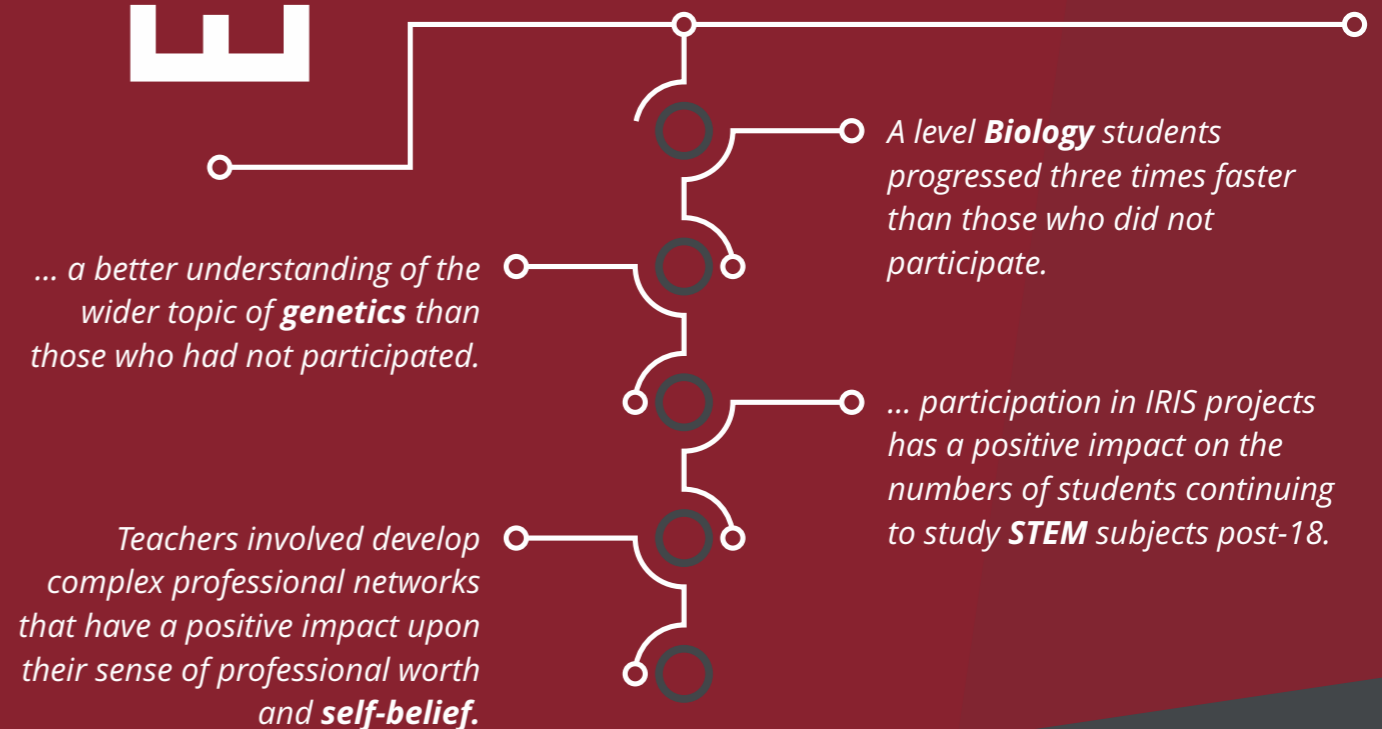
- 1) 360° and longitudinal approach to evaluation – evaluation that includes as many perspectives as possible over a long period of time
- 2) Evaluation that recognises and values the individual

experience – evaluation that includes individual perspectives wherever possible and encourages individual students to contribute to evaluation papers submitted to peer-reviewed journals

- 3) A co-creative approach to evaluation, i.e. evaluation that is designed, implemented, analysed and communicated by participants, including at conferences and in peer-reviewed journal articles

- 4) Evaluation to celebrate the experiences and perspectives of participants through focus groups, case studies and interviews

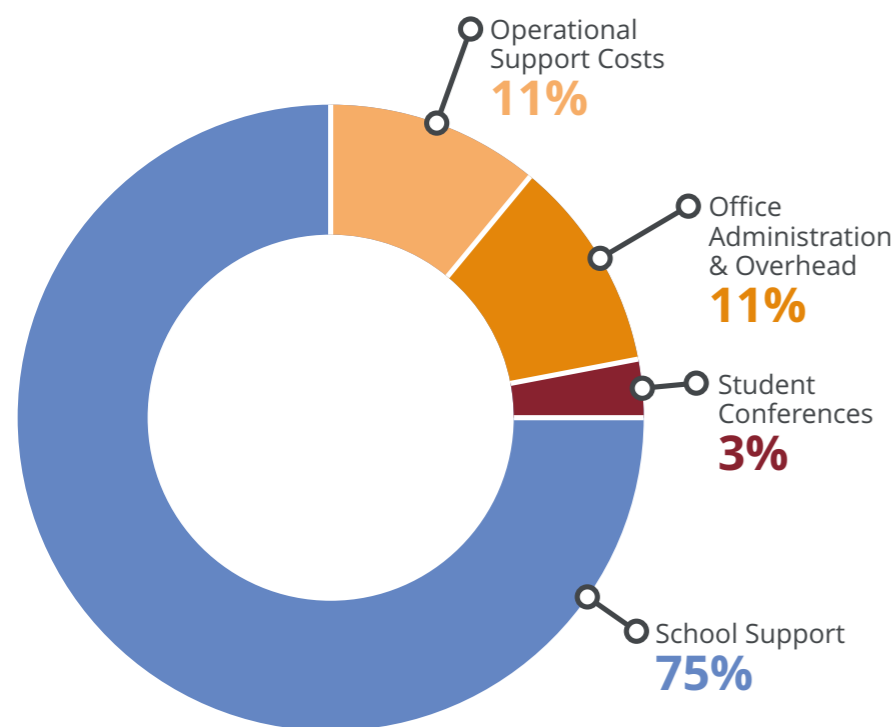
- 5) Evaluation as an opportunity to develop knowledge and understanding beyond establishing the efficacy of an individual project.



FINANCES

	Unrestricted funds 2018 (£)	Restricted funds 2018 (£)	Total funds 2018 (£)	Total funds 2017 (£)
Income from:				
Donations and legacies	450,000	105,373	555,373	607,060
Charitable activities	-	-	-	10,253
Other trading activities	3,509	-	3,509	-
Investments	32	-	32	178
Total income	453,541	105,373	558,914	617,491
Expenditure on:				
Raising funds	624	-	624	15,395
Charitable activities	409,494	52,418	511,877	511,877
Total expenditure	410,118	52,418	527,272	527,272
Net Income before other recognised gains and losses	43,423	52,955	90,219	90,219
Net movement in funds	43,423	52,955	90,219	90,219
Reconciliation of funds:				
Total funds brought forward	66,848	23,371	-	-
Total funds carried forward	110,271	186,597	90,219	90,219

HOW WE SPEND OUR FUNDS



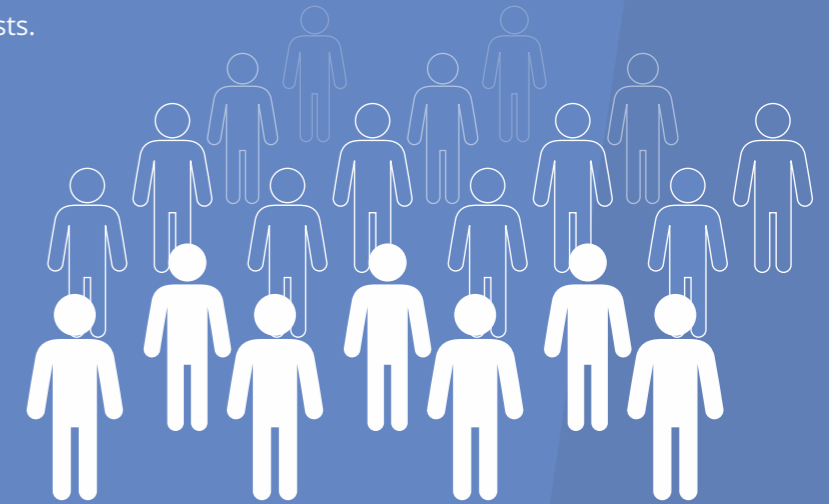
IRIS keeps core costs to an absolute minimum, channelling as much as possible to the delivery of projects and supporting schools. Overheads are kept low by virtue of there being a geographically diverse team, all working from home, and meeting occasionally in person, but maximising the use of technology to avoid travel time and cost. This also places the team closer to our school researchers.

COST-EFFECTIVE, SCALE-ABLE

IRIS supplements the work of its team of seven full-time employees by calling on the skills and services of a wider group of trusted specialists.

Skills and activities we outsource:

- IT services
- Accounts
- HR support
- Graphic design
- System support
- Couriers
- Web design
- PR and Marketing
- Payroll
- Video-production



'We only pay for what we need.'

Steve Greenwood, Chief Executive



OUR PARTNER SCHOOLS

Abbey College Cambridge
 Abingdon School
 Alexandra Park School
 All Hallows Catholic School
 Alleyn's School
 Altrincham Grammar School for Girls
 Altrincham Grammar School for Boys
 Anderson High School
 Anns Grove Primary School
 Ardingly College
 Ardrrossan Academy
 Ashlawn School
 Asker videregående skole
 Bancroft's School
 Bathgate Academy
 Bede's Senior School
 Bedford Girls' School
 Bedford School
 The Bedford Sixth Form
 Bellerbys College Cambridge
 Benenden School
 Berkhamsted School
 Bishop Wordsworth's School
 Bohunt School
 Boroughbridge High School
 Brentwood High School and Community College
 Brighton College
 Bromley High School
 Bryanston School
 Callington Community College
 Cambourne Science and International Academy
 The Camden School for Girls
 Canford School
 Cardinal Newman Catholic School
 Chatham & Claredon Grammar School
 Chaucer School
 Cheltenham College
 Chipping Campden School
 City and Islington College
 Claremont High School Academy
 Cokethorpe School
 Sagrada Família - Gavà
 Colchester County High School for Girls
 Coleg Cymunedol Y Dderwen
 Colegio Anglo Colombiano
 Concord College
 Corbridge Middle School
 Cotham School
 County Upper

Dartford Science and Technology College
 Devonport High School For Boys
 Didcot Girls' School
 Drummond Community High School
 Dubai College
 Dulwich College
 Dulwich College Shanghai Puxi
 East London Science School
 Eastbury Community School
 Educon International School
 Ernulf Academy
 Esher College
 The Folkestone School for Girls
 Forge Valley
 Forres Academy
 Fulneck School
 Gillotts School
 Gimnasio La Montaña
 Graveney School
 Greig City Academy
 The Haberdasher's Aske's Boys' School
 Hallam Primary
 Helston Community College
 High Pavement Sixth Form
 Hockerill Anglo-European College
 Homewood School and Sixth Form Centre
 Inverurie Academy
 Ipswich School
 Joyce Frankland Academy Newport
 Kent College Senior School Pembury
 King Edward VI Grammar School
 King's High Warwick
 Kingsthorpe College
 King's College School Wimbledon
 Kirkwall Grammar School
 Kongsbakken videregående skole
 The Ladies' College Guernsey
 Lady Eleanor Holles
 Lady Manners School
 Lampton School
 Larbert High School
 Leasowes High School
 Liberton High School
 Lismore Comprehensive School
 Liverpool Life Sciences UTC
 Loreto Grammar School
 Loughborough Grammar School
 Loughborough High School
 Madras College
 Mallaig High School
 Malvern College
 Maricourt Catholic High School

Mark Rutherford School
 Marymount International School London
 Merchiston Castle School
 MidKent College
 Mounts Bay Academy
 Mullion School
 Nether Green Junior School
 New Hall School
 Neham Collegiate Sixth Form Centre
 North Lancing Primary School
 Norwich School
 Oakham School
 Oakhill School
 Our Lady's Abingdon
 Oxford High School
 Oxted School
 Parkside
 Penrice Academy
 Peter Symonds College
 Plymouth High School for Girls
 Plymouth Public Schools
 Pocklington School
 Queen Elizabeth's Hospital Bristol
 Queen Elizabeth's Grammar School
 Queen Mary's College
 Queen Mary's Grammar School
 Queen Victoria School
 Queensbridge School
 Radley College
 Redborne Upper School and Community College
 Redmaids' High School
 Reepham High School
 Ribston Hall High School
 Richard Taylor Primary School
 Ringwood Waldorf School
 Riverside Primary School
 Royal Hospital School
 Royal Masonic School for Girls
 Ruislip High School
 Runshaw College
 Ryedale School
 Sackville School
 Sandwich Junior High School
 Sevenoaks School
 Sidney Stringer Academy
 Simon Langton Girls' Grammar School
 Simon Langton Grammar School for Boys
 Sir Robert Woodard Academy
 Sir William Borlase's Grammar School
 Southey Green Primary School

St. Aidan's Church of England High School
 St Albans High School for Girls
 St Andrew's CE High School for Boys
 St Brendan's Sixth Form College
 St David's RC High School
 St Dunstan's College
 St Edmund's College & Prep School
 St Francis School
 St George's School for Girls
 St Helen & St Katharine
 St James Schools
 St John Fisher Catholic High School
 St Lawrence College
 St Leonards, St Andrews, Fife
 St Mary's Catholic High School
 St Mary's School
 St. Olave's Grammar School
 St Philip Howard Catholic School
 St Thomas of Canterbury School
 St. Wilfred's Catholic High School
 Stedelijke Humaniora Dilsen
 Stephen Perse Foundation
 Stewarton Academy
 Stirling High School
 Strathaven Academy
 Stretford Grammar School
 Sutton Grammar School
 Tipton School
 Alun School
 The Archbishop's School Canterbury
 The Bushey Academy
 The Canterbury Academy
 The Community School of Auchterarder

The Coopers' Company and Coborn School
 The Edinburgh Academy
 The Forest School
 Godolphin and Latymer School
 The Harvey Grammar School
 King's Leadership Academy
 Hawthornes
 The Judd School
 The Independent Schools Foundation Academy
 The Littlehampton Academy
 The Mount School York
 The Perse School
 The Portsmouth Grammar School
 The Thomas Alleyne Academy
 Thomas Gainsborough School
 The Thomas Hardy School
 Tonbridge School
 Tor Bridge High
 Urmston Grammar School
 UTC@Harbourside
 Verulam School
 Wales High School
 Wallington High School for Girls
 Watford Grammar School For Boys
 Wellington College
 West London Free School
 Westways Primary School
 William Farr School
 William Perkin CofE High School
 Wimbledon High School
 Winstanley College
 Wycombe Abbey

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Humphrey Battcock
 Science and Technology Facilities Council
 UK Space Agency
 Wellcome Trust
 Garfield Weston Foundation
 Royal Commission for the Exhibition of 1851
 ERA Foundation (Electrical Research Association)
 CERN Medipix Collaboration
 NASA radiation analysis
 Institute of Experimental and Applied Physics Czech Technical University in Prague
 Institute of Physics
 Centre for Polar Observation and Monitoring (CPOM)

... and through pro bono work:

The British Science Association
 The European Bio-informatic Institute
 Salesforce.com
 The Science Museum Group
 Weils (legal advice)
 Wormbase

KEY STATS

> 200 schools now involved.

5% of UK state secondary schools.

70% of our partner schools are state-maintained.

70% of our most active schools are non-selective