

# SCIENCE MUSEUM GROUP

## OUR NEW AGE OF WONDER

ANNUAL REVIEW 2016-17

SON ET LUMIÈRE  
IN BRADFORD

YORK LEADS  
RAIL THINKING

LEARNING'S STEM  
POWERHOUSE

SOYUZ LANDS  
IN LONDON

FLAT OUT  
FOR GRAPHENE

DAME ZAHA'S  
MATHEMATICS





This 360-degree crew's-eye view of Peake's Soyuz cabin was shot using a Samsung Gear VR camera by our group's Digital Lab

# HERO PEAKE'S SOYUZ LANDS IN LONDON

'I'm quite fond of this spacecraft...  
We go back a bit'

Tim Peake, British astronaut

The Soyuz TMA-19M descent module that returned British astronaut Tim Peake safely from orbit is the first spacecraft flown by man to enter the Science Museum Group collection. As the UK's first European Space Agency astronaut, Peake scored a double scoop when he unveiled the capsule at the Science Museum in January. On that day – marking the London launch of the 2017 UK–Russia Year of Science and Education – the news also broke that he would be returning to space.

Standing before his Soyuz, which bears the scorch marks of its 1600 °C re-entry from space, he declared how he 'always gets such enormous pleasure from visits to the Science Museum'. Draped from girders above him was its main parachute which helped cushion his descent to the steppe of Kazakhstan. 'I'm quite fond of this spacecraft,' he said. 'We go back a bit.'

While in orbit, Peake had watched a video of the launch party held in December 2015 at the museum and had wished he had been celebrating too with the 3000 schoolchildren who counted down towards his liftoff. When reunited with the Soyuz, he reminisced about first seeing the capsule crammed with cargo before its launch – 'one of the few times I have been grateful to be only five foot eight' – and then about looking on in awe when it sat atop almost 300 tonnes of rocket fuel before launch.

Among the dignitaries and media present were Mary Archer, who awarded Peake a Science Museum Fellowship; group trustee David Willetts, who in 2013, while UK science minister, paved the way for UK manned missions; Greg Clark, secretary of state; Vladimir Lvovich Solntsev, president of RSC Energia, which built the Soyuz spacecraft; deputy minister of science and education of the Russian Federation, Veniamin Kaganov; and Helen Sharman, first Briton in space.



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[tinyurl.com/y8umaxm3](https://tinyurl.com/y8umaxm3)

*Tim Peake's Space Descent VR – page 18*



WHAT THEY SAY ABOUT US

THE SCIENCE MUSEUM GROUP

‘I am incredibly proud of our science museums. It is so exciting that we are here in Rio working together to engage people in science’

Karen Bradley, secretary of state for Culture, Media and Sport

IN LONDON

‘The Science Museum is an innovative place. Samsung and the Science Museum is a brilliant combination’

Russell Taylor, CMO, Samsung UK and Ireland

IN YORK AND SHILDON

‘A million people have seen Flying Scotsman in the past year. It has become an amazing brand emblem for the National Railway Museum, as much as the Virgin Azuma will be a brand leader for Virgin Trains on the east coast’

Sir Richard Branson, Virgin Group founder

IN MANCHESTER

‘To be given an exhibition at the Museum of Science and Industry was a great honour. It was also a great way to celebrate the innovative spirit that won Manchester the accolade of European City of Science’

Professor Sir Andre Geim, Nobel Prize-winner

IN BRADFORD

‘Our new name, the National Science and Media Museum, emphasises its responsibilities to its local community and the nation as a whole’

Lord Grade, chairman of the museum’s advisory board

OUR FIVE WORLD-BEATING MUSEUMS

Science Museum, London  
National Railway Museum, York  
Museum of Science and Industry, Manchester  
National Science and Media Museum, Bradford  
Locomotion, Shildon

SUPPORT OUR MUSEUMS

Visit [sciencemuseum.org.uk/donate](http://sciencemuseum.org.uk/donate) or for corporate membership and patrons see page 59

THE YEAR ON VIDEO

[sciencemuseum.org.uk/annual-review-video](http://sciencemuseum.org.uk/annual-review-video)

SCIENCE MUSEUM GROUP  
ANNUAL REVIEW 2016–17

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Edited by David Johnson  
with generous input from staff across the group  
and its many bloggers

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*Main photography from group resources:*  
Museum of Science and Industry  
National Science and Media Museum  
National Railway Museum/Pictorial Collection  
Science & Society Picture Library  
Science Museum Library and Archives  
Science Museum Photographic Studio  
Daily Herald Archive/National Science and Media Museum

*With thanks for additional photographs by:*  
Alchemy VR, Tim Anderson, Kasim Asim, Polly Braden, Dan Clarkson, John Clifton, Kieran Davis, Benjamin Ealovega, Drew Forsyth, Fresh Cut Creative, Hugo Glendinning, Nick Guttridge, Jody Hartley, Jennie Hills, Kate Hunter, Keoma Zec Photography, Jody Kingzett, Jason Lock, Barry Macdonald, Lee Mawdsley, National Graphene Institute, Phil Oates, Dan Oxtoby, Hazel Palmer, Richard Pearson, Jonathan Perugia, Plastiques Photography, Dan Prince, Queensland Museum, SMG Digital Lab, Paul Thompson, Virgin Trains East Coast

Printed by Go Agency, using sustainable paper – Cocoon Silk 100, which is produced from 100% post-consumer recycled, FSC certified pulp. Less energy and water are consumed and fewer CO<sub>2</sub> emissions are produced during manufacturing, compared with the production of virgin fibre paper. FSC recycled certification, NAPM 100% recycled certification, ISO 14001, Process Chlorine Free (PCF) and PAS 2020:2009 Level 3

**Cover image:** A thermal imaging camera is sensitive to infrared radiation and enables us to ‘see’ thermal energy and highlight differences between hot and cold places. This proves invaluable in surveillance and in search and rescue. Here, the thermal camera exhibited in *Wonderlab* detects a young visitor and the resulting ‘heat map’ is displayed on a large screen. The opening of a dazzling new *Wonderlab* marked the rebranding of the National Science and Media Museum in Bradford. Photography by Lee Mawdsley

CHAIRMAN’S WELCOME

HARMONY  
AND THE  
POWER  
OF FIVE

Dame Mary Archer, chairman of the Science Museum Group, captures the spirit of an energetic year

The relaunch of the National Science and Media Museum, along with a new brand, a new website and a *Wonderlab* gallery, was perhaps the standout moment in what was a remarkably busy year for the Science Museum Group. The first two months following relaunch saw an increase of nearly a third in visit numbers.

When I tried out the gallery’s interactive delights – its mirror maze, echo tube, hypnotic zoetrope and more – it struck me that the rebirth of our Bradford museum marks a step change in activity across the group. It signals much more to come in a year that saw a significant STEM ambassador programme now run from the Museum of Science and Industry in Manchester, progress at the National Railway Museum with our partners in the York Central development, Locomotion in Shildon smartening up its impressive collection, the superb new *Mathematics* gallery, the opening of the original *Wonderlab* in London’s Science Museum and our growing research strength.

Our priorities are now set within the framework of the group’s new strategic vision, Inspiring Futures 2017–30, which has been developed over the past 18 months by a group ably led by group trustee David Willetts and is published alongside this Annual Review (*see page 61 for a brief outline*).

The group’s vision is to create a society that celebrates science, technology and engineering and their impact on our lives,



now and in the future. We have pioneered the concept of ‘science capital’ – a person’s scientific literacy, their familiarity with science in daily life and their appreciation of science’s worth – and are using this to inspire the next generation of scientists, inventors and engineers.

We are extending our international reach, and the director’s report focuses on this important aspect of our work. Each of the museums within the group has international stature, as well as a fierce sense of pride in its regional heritage, but we now work more as a group where it makes sense to do so, for example in

creating our new unified Science Museum Group Collection website.

I am grateful to the Board of Trustees who give of their time and expertise so willingly in both formal and informal capacities. It remains essential for all our museums to forge new philanthropic and corporate funding relationships, and I especially thank all our donors and partners. Together we will fulfil the group’s mission to inspire futures.

**Above:** At our Bradford museum’s relaunch this spring: its chairman Michael Grade, Mary Archer and museum director Jo Quinton-Tulloch



‘The Science Museum Group enjoys a unique place in the UK learning ecosystem and is a global leader for inspiring schoolchildren and helping to nurture the next generation of engineers’

Professor Dame Ann Dowling,  
President of the Royal Academy of Engineering

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Locomotion, Shildon  
Science Museum Group Store  
Blythe House Collections Store

**Pictured:** Flash! Bang! Wallop! An explainer demonstrates the chemistry of explosions in a live event in our London *Wonderlab*



# OUT IN THE WORLD: POWER WITH PURPOSE

In an extraordinary year for travel, group director Ian Blatchford outlines the extent of our global reach and a reciprocal appetite for creative collaborations

Britain is witnessing a period of extraordinary political activity, not the least being the Brexit referendum and a general election this year. There will be a period of political and economic uncertainty as the exit terms are agreed, and so it is vital that all leading national institutions play their part in promoting British values and ambitions to existing and potential international partners. Happily, internationalism is a core value for the Science Museum Group, as innovation in science and engineering is so collaborative and cross-border. At the same time, Britain has an amazing story to tell about its contribution to world science, in past and future, and the nation will also need more young people to make STEM career choices if we are to thrive in the new economy.

To underline our role as the world's leading alliance of science museums, and commitment to our new strategy (*see page 61*), let's take a world tour of how the group embraced the international scene over the past year. Our long-standing friendships in Europe and the USA thrived, we signed a major partnership in Brazil and signalled

new strategic alliances in India and China. We continued to relish strong relationships with European partners. In Manchester, the Museum of Science and Industry played a pivotal role in the EuroScience Open Forum, the largest interdisciplinary meeting in Europe. As the city celebrated being European City of Science, the museum's Manchester Science Festival also broke records and became the most popular science festival in the country. In London, the Science Museum hosted the British showing of an exhibition, *Leonardo da Vinci: The Mechanics of Genius*, curated by Universcience in Paris and the National Museum of Science and Technology Leonardo da Vinci in Milan.

The great acquisition of the year on behalf of the nation was the Soyuz spacecraft used by Tim Peake on his Principia mission as the first UK astronaut of the European Space Agency (*see inside front cover*). A constellation of 12 astronauts and cosmonauts from the Association of Space Explorers gathered in May to celebrate the 25th anniversary of the launch of the first UK astronaut, Helen Sharman. Her

self-anointed 'space sister', Valentina Tereshkova, also made a special journey to celebrate her 80th birthday at a gala concert in the museum (*see page 52*).

The Science Museum also deepened its cultural bonds with the Russian scientific community as 2017 brought the UK–Russia Year of Science and Education. I signed a partnership agreement with the largest space museum in Russia, the Tsiolkovsky Museum of the History of Cosmonautics in Kaluga; and the museum's ground-breaking *Cosmonauts* exhibition closed in Moscow after a long run and rave reviews.

During the 2016 Summer Olympics in Brazil, at Rio de Janeiro's Museum of Tomorrow, a spectacular new science centre in the harbour, I secured a partnership memorandum in the presence of the UK secretary of state for Culture, Media and Sport, Karen Bradley, along with the British ambassador and British Council director to Brazil. The agreement received extensive media coverage in Brazil and was presented as an exciting alliance of established and emerging science

powerhouses joining forces on projects exploring the future of antibiotics and also agriculture, a vivid illustration that almost every significant scientific challenge needs a global perspective and invariably British scientists are showing impressive leadership. And at the Museum of Astronomy and Related Sciences in Rio, I signed a contract to show our exhibition *3D: Printing the Future*.

During a trade mission to Delhi and Bangalore in late 2016, the British and Indian prime ministers announced the Science Museum's plans for exhibitions in autumn 2017 centred on the rich history of Indian scientific innovation. These form a major part of the UK–India Year of Culture in 2017. As in our recent work in Russia, the group enjoys exceptionally strong partnerships with the British Council and Foreign & Commonwealth Office.

Moving further east, we made a significant start on forging relationships in China in October with presentations at a major symposium in Shanghai for the nation's science and technology museums and

partnership meetings in Beijing, Hong Kong and Wuhan (by deliberate coincidence a delegation from the Wuhan Science and Technology Association visited our Museum of Science and Industry). Staff exchanges, expertise sharing and exhibition planning are already following on from this, as does our growing portfolio of touring exhibitions, which by the end of the year had been seen by more than a million people.

Continuing our global perspective, the Science Museum held a highly successful Lates event for the Bill and Melinda Gates Foundation in which Bill Gates and pop star will.i.am were watched in-conversation by a quarter of a million people worldwide on Facebook.

Coupled with the remarkable vibrancy in current British science, the work of the Science Museum Group is rightly celebrated as a unique and powerful player in cultural diplomacy.

**'We should become the most truly international group of science museums in the world; and become a powerful cultural diplomat, providing outstanding promotion of British science and values'**

Ian Blatchford

**Above:** A new partnership sealed in Rio... British Council director in Brazil Martin Dowle, Ricardo Piquet, director of the Museum of Tomorrow, UK culture secretary Karen Bradley, Ian Blatchford and then UK ambassador to Brazil Alexander Ellis





# WE ARE THE PLACE TO BE



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## 'The Science Museum's new Wonderlab gallery is the best thing you can currently do in London with kids'

Time Out magazine

**1** Richard Leese, deputy mayor of Greater Manchester, speaks at the opening of the *Wonder Materials: Graphene and Beyond* exhibition at the Museum of Science and Industry

**2** Ellie Simmonds (left) and Eleanor Robinson (right) with BBC's Hacker T Dog enjoying the Museum of Science and Industry before going on the parade for Olympic and Paralympic heroes

**3** Paul Kirkman, director of the National Railway Museum, alongside Andrew Adonis, chairman of the National Infrastructure Commission, at a Future Forum event in York

**4** John Romero, co-creator of *Doom*, was among video game designers, developers and players attending the inaugural Yorkshire Games Festival at the National Science and Media Museum

**5** At a Science Museum schools event, NASA administrator Charles Bolden shared stories about the forthcoming asteroid mission OSIRIS-REx and deploying the Hubble Space Telescope. He was interviewed by physicist Lucie Green, a Royal Society university research fellow

**6** Python comedian Eric Idle at the launch of the Science Museum exhibition honouring the 80th birthday of cosmonaut Valentina Tereshkova

**7** At *Wonderlab* launch night, former chancellor George Osborne, Science Museum Group chairman Mary Archer, managing director of Statoil UK Rob Adams and group director Ian Blatchford

**8** Bradford MPs Naz Shah and Philip Davies visit Soyuz TMA-19M in London with Jo Quinton-Tulloch, director of the National Science and Media Museum, where Soyuz tours this autumn

**9** Astronomer Royal Martin Rees with Helen Sharman, first Briton in space, and Sarah Sands, then editor of the *Evening Standard* at the newspaper's Progress 1000 launch

**10** Discussing 'Do we need experts?' at the Science Museum Lates in January, Rowland White of Penguin Books, physicist Jim Al-Khalili and geneticist Steve Jones

**11** Deputy lord mayor of Bradford councillor Alun Griffiths, director of the National Science and Media Museum Jo Quinton-Tulloch and artist Mat Collishaw at the launch of the *Fox Talbot: Dawn of the Photograph* exhibition

**12** Mary Dowson, director of BCB Radio, meets Gillian Reynolds, journalist and member of the advisory board, at the National Science and Media Museum's *Wonderlab* opening

**13** HRH The Prince of Wales was named 'Londoner of the Decade' at the *Evening Standard*'s celebration of London's most influential people at the Science Museum. Here enjoying Joanna Lumley's company

**14** Nobel Prize-winner Andre Geim at the opening of *Wonder Materials: Graphene and Beyond* at the Museum of Science and Industry in Manchester, with director Sally MacDonald and group director of external affairs Roger Highfield



# BRADFORD REBOOTS

A unique new hands-on gallery underlines our museum’s strengths in sound and vision

What a difference a year makes. In these pages last year we wrote of taking steps towards ‘fulfilling our promise’. In a blog post, group chairman Mary Archer wrote of the Bradford museum developing ‘a tantalising picture’ of its potential.

Now, 12 months later, an extraordinary fanfare has surrounded the opening of our own unique interactive gallery, *Wonderlab*, along with a stunning new visual identity for the museum and an industry-leading website. There is a palpable sense that the newly named National Science and Media Museum has been, in the words of director Jo Quinton-Tulloch, well and truly rebooted.

Michael Grade, chairman of the museum’s advisory board, says: ‘The recent investment of £1.8 million in the new *Wonderlab* is proving a game-changer – a truly world-class attraction for the region.’ Most of the exhibits – which reveal the science of light, sound and perception – have been made especially for our world-class gallery, many by scientists, artists and technicians from the region.

Visitors see their body split from their head as they walk, hear their voice echo through a 15-metre-long tube, experience an anti-gravity mirror and a musical laser tunnel, and can operate one of the world’s first 3D-printed zoetrope installations. People often refer to experiences like our fondly remembered magic carpet ride, and we believe these interactives will inspire the same affection in years to come.

**Right:** Entertainment at the *Wonderlab* launch... which was attended by lord mayor of Bradford councillor Geoff Reid... One of the exhibits enables you to explore sound waves using water

The museum’s world-beating collections across the technology and culture of photography, film and TV are widely acknowledged to be unrivalled; *Wonderlab* explores the science behind what makes these phenomena wondrous. Building on the experience of creating the Science Museum’s *Wonderlab* which opened in London last October, our gallery in Bradford is already inspiring the next generations of scientists, engineers, film-makers and artists to see more, hear more, think more and do more. As Sir Gary Verity, chief executive of Welcome to Yorkshire says: ‘*Wonderlab* has the potential to blow minds of all ages.’

The evidence of the opening weekend is compelling: 3100 people came to enjoy *Wonderlab*, with some travelling 100 miles to play with light, sound and perception.



‘Yorkshire has an amazing selection of national museums and we are delighted to see Bradford launching a cutting-edge new gallery giving visitors yet another reason to choose Yorkshire’

Sir Gary Verity, chief executive of Welcome to Yorkshire

**Left:** Visitors to *Wonderlab* see if they can tell reflections and reality apart  
**Below:** Michael Grade is challenged to explore the science of sound by group chairman Mary Archer and museum director Jo Quinton-Tulloch. Behind them, group trustee Ludmilla Jordanova





# A BEACON FOR EVERY BRADFORD FAMILY

New world-class galleries are on the horizon but our immediate priorities are local

Bradford's National Science and Media Museum has spent the past year cementing its position as a beacon for its very broad community. In 2016 two exhibitions used photography and community engagement to challenge perceptions of difference and celebrate diversity.

There are about 1.5 million people in the UK with a learning disability and 700,000 with autism. Photographer Polly Braden spent two years working with just a few who are supported by MacIntyre, a charity that provides support and care to children and adults with learning difficulties. A ground-breaking exhibition, entitled *Great Interactions*, presented images and stories which recognised the daily interactions and achievements of people with a learning disability. The aim was simple: to challenge outdated perceptions of what it means to live with a learning disability.

Over the summer the *In Your Face* exhibition built on *Great Interactions* to explore the science behind how humans are 'hard-wired' to see and judge faces. The exhibition took as its point of departure the idea that faces are the major vehicle through which we connect with each other and used science and technology to help visitors develop their capacity to see and notice more, and judge less.

Curators worked with the campaign group Changing Faces, which challenges appearance-focused discrimination, to develop the show's content, ranging from historical still photography to cutting-edge

interactive displays. Thought-provoking exhibits included examples of darkroom manipulation dating from just 20 years after photography's invention, plus the *Before & After* project by journalist Esther Honig, who asked photo editors around the world to manipulate her portrait and 'make me beautiful'.

Taken together, *Great Interactions* and *In Your Face* illustrate the museum's commitment to being truly open for all.

*Celebrating the Yorkshire Games Festival*  
– page 19



A new licensed bar has opened alongside Pictureville cinema in the Bradford museum, which can screen all historic film formats



**'We have seen a total makeover for the museum. We are well and truly rebooted as the new home of Wow'**

Jo Quinton-Tulloch, director of the National Science and Media Museum

## Listen out and watch out!

Changing our name to the National Science and Media Museum now makes clear what people can expect when they visit. It is the start of a long-term strategy to look at the museum's core subjects differently through the prism of science and technology.

We are now working to create the *Sound and Vision* galleries which will, for the first time, bring together our most important objects, covering the key moments in the history of photography, film and television. As group chairman Mary Archer puts it: 'Glorious collections will move from the basement stores to public display.'

The museum has worked with the leading agencies North and Numiko to create a visual identity and a digital presence that will, for the first time in its history, match the ambition and quality of what happens within our walls.

Museum director Jo Quinton-Tulloch says: "Ours is a museum that is here to stay, to grow and to thrive."

**This page, clockwise:**  
The museum's rebranded exterior... 'Lucie, Milton Keynes Sports Centre' is one of Polly Braden's *Great Interactions*... Esther Honig's project *Before & After* for *In Your Face*





# IGNITING LONDON'S CURIOSITY FOR SCIENCE

The Science Museum's world-beating hands-on gallery aims to extend our reach beyond traditional museum audiences

## 'Wonderlab helps visitors to think like scientists and gain an insight into the transferability of those skills'

Toby Parkin, head of learning and curator of Wonderlab

Last October, the Science Museum Group's mission to inspire the next generation of scientists and engineers reached a major milestone as *Wonderlab: The Statoil Gallery* opened its doors and welcomed 205,000 people in its first six months – representing 11% of all visits to London's Science Museum. Collaborating with Muf Architecture/Art, we have created a truly inspirational hands-on experience where visitors of all ages can observe and experiment in seven science zones, from light and sound to maths and space.

The gallery shows the beauty of science and helps young and old to apply the skills that scientists need – curiosity, close attention and creativity. There is a slide with three lanes made of different materials so you can gauge the fastest. A huge rotating turntable models the solar system and invites you to see how day, night, seasons and eclipses are created. You can touch a cloud, see lightning strike or ask for your own chemistry experiment to be staged at a laboratory bench.

We launched a national campaign to raise awareness of *Wonderlab's* opening. It sets out to inspire adults and children alike to think differently about the world and to recognise that wondering is a powerful, positive activity. We took high-profile advertising spots across the country and invited David Attenborough to voice a short film explaining the power of wonder. Public figures such as Patrick Stewart, Professor Brian Cox, Pharrell Williams, Lauren Laverne and NASA's Charles Bolden shared their own wonder as part of our social-media campaign.



Twelve winning schoolchildren brought their classes as the first visitors to experience the gallery's 50 exhibits. *Wonderlab* was officially opened by minister of state for digital and culture Matt Hancock at a starry event also attended by former chancellor George Osborne.

Figures such as Stephen Hawking, Helen Sharman and James Lovelock have all been inspired as young visitors to the Science Museum, and we hope that the great scientists of the future will cite *Wonderlab* as their inspiration. The

museum also initiated relationships with the charities Family Action, Gingerbread and IntoUniversity to extend its reach.

Two new corporate sponsors have helped inspire the next generation by making possible *Wonderlab: The Statoil Gallery* – title sponsor Statoil, and major sponsor URENCO. Further generous support for *Wonderlab* came from the Stavros Niarchos Foundation, the Royal Commission for the Exhibition of 1851, individuals and other organisations.



**Opposite:** *Wonderlab's* Infinity Boxes  
**This page, top:** Live experiments at the Chemistry Bar

**Left:** Guests at *Wonderlab's* starry launch night included Meera Syal and her family, and Vic Reeves and his wife Nancy Sorrell

**Above:** Science Museum director of external affairs Roger Highfield, DCMS minister Matt Hancock and group deputy director Jonathan Newby





# YORK DECLARES FULL STEAM AHEAD

‘We’ve invested in a lively approach to explaining railway know-how to future engineers (and their parents)’

Paul Kirkman, director, National Railway Museum



*Flying Scotsman*’s glorious tour of the British Isles began what became a year of real progress for the National Railway Museum when about 1 million people enjoyed seeing this magnificent icon of the steam age. In York experimental new approaches to temporary exhibitions have enlivened the presentation of our national collection as we diversify the museum’s appeal.

Director Paul Kirkman said: ‘Progression is very much the golden thread for our past year which finished with the agreed sale of our brownfield site – the first down-payment on our transformative vision for an enhanced global museum in 2025.’

Our *Flying Scotsman* season kicked off with a free 3D experience in sound and vision examining the dramas of the locomotive’s celebrity career and a display in the Great Hall telling the century-old history of the luxury service between London and Edinburgh.

The museum announced the final cost of returning *Flying Scotsman* to the tracks as £4.5 million, after a complex restoration project lasting a decade. The price was handsomely rewarded with record audiences and sold-out heritage tours as our best ambassador demonstrated the engineering behind steam traction to new generations of fans.

Steam rides were a big hit with younger railway enthusiasts, generating £51,000 in six months. A premium offer of *Flying Scotsman* footplate experiences sold out within four days, demonstrating the demand for authentic experiences among railway enthusiasts. In April *Flying Scotsman* took part in the ‘Four Trains’ event which celebrated the past, present and future of the East Coast Main Line.

As the museum aims to tell bigger, bolder stories by providing more sensory experiences for visitors, we launched *Ambulance Trains* as a permanent display on the 100th anniversary of the Battle of the Somme with the support of the Heritage Lottery Fund. Set aboard an historic railway carriage, projection, film and sound remind us vividly how ambulance trains once evacuated sick and injured troops during the First World War (see page 25).

To grow ‘science capital’ – a person’s scientific literacy, their familiarity with science in daily life and some appreciation of science’s worth – in individuals and society, the National Railway Museum opened its first Future Engineers programme. Young people, schools and families explored railway engineering topics with hands-on activities attended by engineers and rail industry professionals.



**Top:** A unique line-up celebrating past, present and future on the East Coast Main Line – the museum’s *Flying Scotsman*, ahead of a Virgin Azuma (Class 800), due to enter service in 2018, and Virgin HSTs Class 91 and Class 43  
**Left:** *Future Engineers* exhibition  
**Above:** Timothy Hackworth’s original steam locomotive *Sans Pareil*, which took part in the 1829 Rainhill Trials against *Rocket*, being rehoused in the collections hall at Locomotion, Shildon, this year. The iconic engine was presented to the Patent Office Museum (what became the Science Museum) in 1864  
**Right:** *The Missing Passenger* murder mystery exhibition

**VIEW THIS**  
[nrm.org.uk/planavisit/events/mystery/mystery-on-the-rails](http://nrm.org.uk/planavisit/events/mystery/mystery-on-the-rails)

This year the *Mystery on the Rails* season trialled an immersive way for visitors to discover how railways have inspired detective fiction. Set aboard a series of historic railway carriages, the programme highlight of *The Missing Passenger* invited visitors to step into a murder mystery as the detective trying to identify the culprit. Other innovations include a new *Mallard*-themed special educational needs learning programme.

Icing on the cake: the museum’s café in the Pullman carriage *Countess of York* won first place for Afternoon Tea of the Year in the Visit England Awards 2017.

*Flying Scotsman*’s popularity continues to drive sales of the retail range, created under licence by Peter Black, delivering £10,000 gross profit from strong sales in all outlets including the National Railway Museum shop, [nrmshop.co.uk](http://nrmshop.co.uk) and in Marks & Spencer stores.

*Shildon Shed Bash* – page 64





# MANCHESTER MARRIES SCIENCE AND CREATIVITY

Our Castlefield museum is at the heart of important initiatives in education and European collaboration

'We are the northern home for creative science engagement,' says Sally MacDonald, director of the Museum of Science and Industry. It is a bold claim, but one that the museum is well placed to make, following an exceptional year at the centre of Manchester's tenure as European City of Science (ECOS). At the closing party for ECOS, Nancy Rothwell, president of the University of Manchester, who was awarded a Science Museum Group Fellowship at the event, said it was a 'hugely exciting time for public engagement with science'.

The museum also played a key role in the EuroScience Open Forum programme,

which saw 4500 scientists and science communicators from across the world come to Manchester to discuss the latest breakthroughs in science.

We not only support established scientists, we are also inspiring new generations. Sally MacDonald said: 'We are a driving force for Manchester as a science city, and also play a vital part in developing STEM skills across the city and wider region. That's what's unique about this museum. We can create historic experiences such as our popular steam train ride or produce England's biggest science festival, and at the same time embed STEM learning and encourage

**'We are a driving force for Manchester as a science city, and also play a vital part in developing STEM skills across the wider region'**

Sally MacDonald, director of the Museum of Science and Industry



**Opposite:** Visitors to the Science in the City Lates event make jewellery based on the structure of graphene

**This page, clockwise:** Melvin Bragg aboard the museum's replica *Planet* locomotive during a recording for BBC Radio 4... Olympic gold medal-winning boxer Nicola Adams meets Sally MacDonald during the Team GB homecoming parade... Nancy Rothwell receives her Science Museum Fellowship from Mary Archer... Russell Kane, Helen Czerski, Robin Ince, Brian Cox and Danielle George record Radio 4's *The Infinite Monkey Cage*



children and young people to develop a love of science that will stay with them their whole lives.'

This was the year the museum also launched *Wonder Materials: Graphene and Beyond* – the first time the team had produced in-house such a major exhibition – about a revolutionary new material. An interview with Andre Geim – whose laboratory isolated graphene – became the museum's first live streamed event, in partnership with BBC *Focus* (see *inside back cover for full feature*). Sally MacDonald said: 'Our museum tells the story of how pioneering ideas can change



the world, and this exhibition is a perfect example. It goes on an international tour after closing in Manchester.'

Last summer the museum also hosted a gathering of Team GB's Olympic and Paralympic athletes including multi-medal-winners Sarah Storey, Ellie Simmonds and the Brownlee brothers, before their triumphant homecoming parade across Manchester. Other successes included the group's *Cravings* exhibition and the second year of maker weekend MakeFest, while we featured as the location for BBC Radio 4's *Infinite Monkey Cage* starring Brian Cox and Robin Ince.



Development of our exciting new gallery continues. MacDonald said: 'The Special Exhibition Gallery designs are really stunning – Carmody Groarke are fantastic architects to work with. Their approach is to strip away recent alterations to reveal the beauty of our historic buildings whilst creating a glorious contemporary exhibition space.'

The gallery is the first stage in a transformation of the museum site that will see significant investment in its outdoor spaces, new entrances and new galleries. This puts the museum at the heart of the area's regeneration, and of Manchester's growth as a science city.



# DIGITAL ENERGISES EVERYTHING WE DO

A digital dimension is increasingly at the heart of everything the group does, from presenting our collection and scholarship online to transforming how our audiences engage with the museums before, during and after their visits. A core focus of this year has been beginning to refresh the group's online estate with new websites for the collection and the National Science and Media Museum (*see page 44*). At the same time we've started to explore the potential of virtual reality so audiences may experience the collection in astonishing new ways.

With Samsung as the founding partner, we have also initiated a new, experimental strand of activity called the Digital Lab through which we have begun to trial new technologies such as enhanced digitisation of collection objects and VR.

The 360-degree view of the Soyuz cabin on our inside cover was shot using a Samsung Gear VR camera. Wearing a VR headset, you see the complete interior by turning your head.



**Above:** The National Science and Media Museum's new website

We also held a 'hackathon' in February to bring together technologists and designers to explore the group's collection data and present it in new ways.

## Space ride with Major Tim

Step aboard a Soyuz space capsule in the Science Museum's latest ride, Space Descent VR with Tim Peake. As Soyuz tumbles toward Earth from the International Space Station, visitors enjoy a 360-degree view both inside the cabin and of outer space during the dangerous, high-speed 400 km journey. At the London unveiling of his Soyuz spacecraft Peake remarked that the VR experience 'really is breathtaking – and that comes from someone who has spent an awful lot of time using VR systems while training'. Space Descent VR was commissioned by the museum and developed by the team at Alchemy VR, led by founder Anthony Geffen, working with us and the European Space Agency, using Samsung Gear VR technology.

## VR way through the maths maze

You can sense maths all around you by sitting in a vintage aircraft cockpit for an immersive ride exploring the mathematical principles inherent in the plane's design. This prototype VR experience for the Samsung Gear VR takes its inspiration from the experimental 1929 Handley Page biplane that forms the iconic centrepiece of *Mathematics: The Winton Gallery* at the Science Museum (*see back cover*). It recently won a MUSE award from the American Alliance of Museums.

**VIEW THIS**  
[collection.sciencemuseum.org.uk](http://collection.sciencemuseum.org.uk)



**Above:** Astronaut's view of Space Descent VR with Tim Peake

**Right and below:** Delegates get hands on consoles at the Yorkshire Games Festival, while game designer Brenda Romero meets some of her fans



**Top right:** Game design workshop at the Yorkshire Games Festival with Fee Stewart

**Centre:** VIPs try out VR at the *Mathematics* gallery opening  
**Right:** Gary Napper, design director on *Alien Isolation*



## 'An unrivalled opportunity to celebrate the great games created in Yorkshire'

Kathryn Penny,  
 Yorkshire Games Festival director



## Gaming as a key cultural force

The UK games industry is currently worth \$3.8 billion, and 9% of that is based in the Yorkshire and Humber region, so the National Science and Media Museum was the perfect host for the inaugural Yorkshire Games Festival. Over five days in November, 7600 visitors enjoyed workshops, big-screen demos and unrivalled access to games designers, writers and developers, all timed to celebrate the 21st anniversary of the iconic game *Worms*. Collaborating with Bradford College and the University of Bradford, the festival created a unique rendezvous for students and key British innovators such as software designers Charles Cecil and Gary Napper.

**VIEW THIS**  
[youtu.be/XkwA2lC-VVg](https://youtu.be/XkwA2lC-VVg)

## Nintendo treats for half term

This year the hit Japanese animation and video game series *Yo-Kai Watch* took over the National Science and Media Museum for nine days of family activities and attracted 23,300 visitors. They designed their own cardboard game controllers, played the latest game for Nintendo 2DS and Nintendo 3DS, and met the star mascot Jibanyan.

Other gaming events organised elsewhere within the Science Museum Group included Power UP! at the Science Museum and Play It at the Museum of Science and Industry (*see page 49*).



FUNDRAISING

‘Our museums’ significant contribution to the international cultural landscape cannot be overstated’

Donald Brydon, chairman, Science Museum Group Foundation

**Top row:** Group trustee David Willetts at the Science Museum annual dinner with geneticist Kay Davies and the National Heart and Lung Institute’s Ajit Lalvani... Russell Taylor, CMO Samsung UK and Ireland, with Ian Blatchford at the *Mathematics* gallery launch

**Centre row:** Rüdiger Grube and Bastian Grunberg of DB Mobility Logistics at the National Railway Museum annual dinner with museum director Paul Kirkman... Biotechnologist Craig Venter addresses the Science Museum annual dinner 2016



VISITORS  
GIVE MORE  
GENEROUSLY  
THAN EVER  
BEFORE

FUNDRAISING

During the past year giving by the average visitor to our five museums rose to its highest level ever, more than £2,895,000 in total, with a £200,000 boost from Gift Aid donations. ‘We are hugely grateful for the generosity of all those who donated when they came to our museums,’ said Lydia Lee, director of development.

While the group is delighted with this munificence, it is also proud to have renewed group-wide relationships with major funders such as the Wellcome Trust and the Heritage Lottery Fund. It remains essential for all our museums to continue to forge new philanthropic and corporate funding relationships and, in doing so, we are grateful for the support of the Science Museum Group Foundation.

Donald Brydon, chairman of the Foundation, says: ‘The collections we hold are a national resource to be cherished, celebrated and built on for the enrichment of our society. Our exhibitions and outreach programmes inspire curiosity in our visitors.’

At the Science Museum we have worked with patrons, philanthropic individuals and several new foundations: Lloyd’s Register Foundation, which supported *Our Lives in Data* and is the biggest charitable donor in the world, and the Bill & Melinda Gates Foundation, which supported a Science Museum Lates event. We are delighted to have welcomed six new corporate sponsors and are pleased to announce a strong commitment to the museum’s mission from our long-term supporter GSK, with a £2 million gift for the forthcoming *Medicine Galleries*.

At the Museum of Science and Industry, the continuing support for the Manchester

Science Festival – the most popular in England – exemplifies the importance of our loyal, long-term partners. At this year’s event, Siemens’ executive management board kindly volunteered its time to deliver science busking. The University of Salford hosted the Science Jam, an interactive experience for festival visitors. The support from Haydale Limited and The Granada Foundation contributed greatly to the success of *Wonder Materials: Graphene and Beyond* (see inside back cover), which was a huge draw for delegates visiting the 2016 EuroScience Open Forum, the continent’s largest interdisciplinary science meeting.

In West Yorkshire, we have been working closely with our long-standing partners Bradford College, the University of Bradford and Bradford Council, successfully debuting the Yorkshire Games Festival at the National Science and Media Museum. Widescreen Weekend hosted its 20th edition with the support of the British Film Institute, and we collaborated for the third year running with the International Moving Image Society on the Student Widescreen Film of the Year Competition.

The National Railway Museum has kept on track important partnerships with Virgin Trains East Coast, sponsor of the *Flying Scotsman* season, and Network Rail. An exciting new initiative is Future Engineers, where corporate sponsorship from Angel Trains, Eversholt Rail and Porterbrook helped our visitors to think about how they could shape the railways of tomorrow. Our Future Forum thought leadership sessions have proved popular, providing the rail industry with a neutral and trusted platform for discussions about the direction of travel of this multi-billion-pound enterprise.



**Left to right:** Statoil guests Rachel Goodfellow-Dunster, Oliver Dunster, Emily Martin, Dominic Martin with Elizabeth Phipps of our development team at the Science Museum annual dinner... HLF trustee Jenny Cousins explores the Science Museum’s *Robots* exhibition... *Mathematics* funder Steve Mobbs at *Robots* launch





# KEY ROLES FOR THE ARDENT VOLUNTEER

**‘Volunteering at the Science Museum is a satisfying way to contribute to society’**

Luis Bercho, volunteer and winner of the Team Player award at the Science Museum 2017 Volunteer Awards



## York’s art collection surveyed

Nothing makes for better volunteers than a passion for the field they dive into, whether that’s railways, media, industry or pure science. The dedication and passion of our teams across the group has been exceptional in the past extraordinarily busy year. The National Railway Museum boasts the biggest team of volunteers and this year nearly 300 gave 41,000 hours providing critical support at special events, such as the *Stunts, Speed and Style* season and the interactive exhibition *Future Engineers*.

A core of regulars play a major role in the operation of the museums in York and Shildon, for example as our information-point team, as volunteer guards accompanying steam rides, and running the popular miniature railway which generated almost £200,000 this year. Additionally, volunteers regularly contribute to the restoration and cleaning of the rolling stock.

Behind the scenes, the conservation team partnered with the University of York, recruiting students to undertake

a condition survey of our art collection, and John Watling completed a 20-year project to locate and catalogue drawings in our collection about the locomotive works of the Great Eastern Railway.

**Above:** Object-handling in *Information Age* with Science Museum volunteers Mike Shannon and Luis Bercho

## Mingling with visitors in London

At the Science Museum volunteers have given more than 8,000 hours over the past year, delivering tours and object-handling sessions to reach 13,500 visitors. The volunteer team is now at an all-time high of 185, thanks to new roles such as the event ambassadors who assist with our ever-popular Lates evenings. Building on the success of the *Cosmonauts* engagement volunteers, a team of nearly 70 stepped up to move among visitors to *Robots* to demonstrate many of the working exhibits and showcase the handling collection. We also welcomed the first commercial event volunteers who contributed nearly 2000 hours to support Power UP!



**‘I have found new a respect and understanding for the historical and scientific value of the collection’**

Cameron Tailford, Bradford volunteer, who was recently offered a PhD studentship, helped by this experience

**Clockwise, from top:** Manchester *Wonder Materials* volunteer Javiera Leemhuis helps visitors get to grips with graphene... Craig Shaw volunteers at the National Railway Museum... At the 2017 Volunteer Awards two York volunteers, Brian Gardener (second from left) and Tony Oldfield (third from right) were specially mentioned... Bradford volunteer Cameron Tailford encounters a 1980s-vintage *Doctor Who* Cyberman



**‘Developing a group-wide digital system for volunteer information, and making sure it works uniquely for all sites, has been very rewarding’**

Tony Oldfield, York volunteer



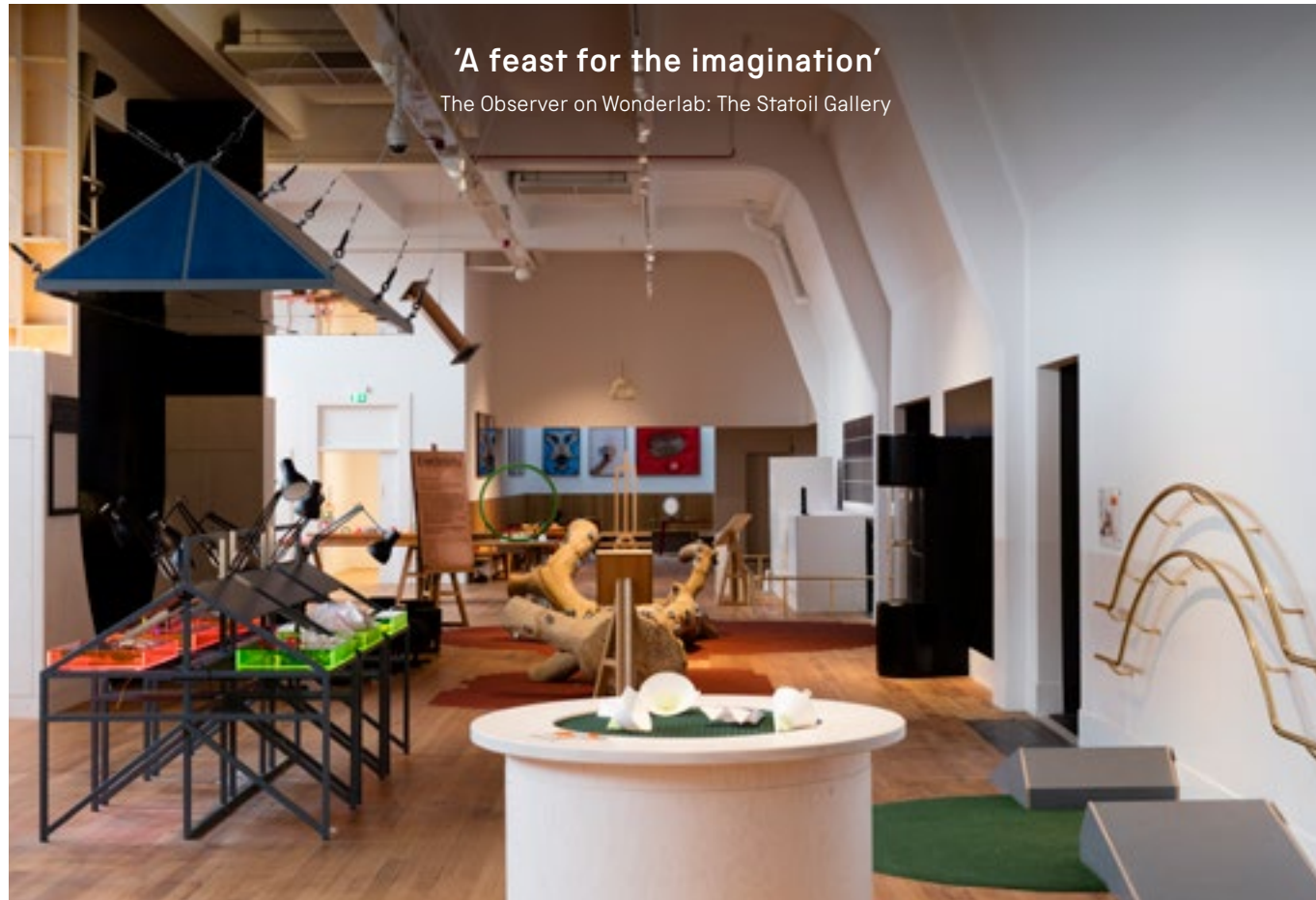
## New skills in Manchester

With around 160 volunteers, this year the Museum of Science and Industry celebrated having a more diverse intake than ever before. The museum played a key part in the city’s Volunteering for Wellbeing scheme, which helped participants gain work experience, new skills, improved health and wellbeing, and concluded in an event celebrating its success at Manchester Town Hall. In October museum director Sally MacDonald and Mary Archer were joined by Michael Bailey, president of the Friends Association, to unveil a commemorative plaque to celebrate the valuable contributions made by the friends of the museum since their inception in 1983. Volunteers also took on more responsibility as champions at the *Wonder Materials* exhibition, providing visitors with guidance and information in the gallery.

## Stars of widescreen

The National Science and Media Museum’s festival volunteers played a key role in the rip-roaring success of two key events: the Widescreen Weekend and the Yorkshire Games Festival. Our library volunteers and Lewis Morley Archive volunteers continue to provide critical routine support to museum staff, cataloguing our Kodak albums and helping us care for the museum’s collection, while also helping to deliver the monthly Reminiscence Sessions and weekly Silver Screenings.





# STARCHITECT SPACES, PREMIER PARTNERS

In 2016 we opened spectacular new spaces as part of the Science Museum's ambitious Masterplan led by Karen Livingstone – all brought to life by the most inspirational names in international architecture. The *Architects' Journal* praised our continuing support of both emerging and established firms which 'demonstrates that in certain sectors there remains an appetite for innovation and creativity that eclipses any misplaced perception of risk'. To cap it all, both our maths gallery and Dana Research Centre have won RIBA London Awards.

As specialists in the playful aspects of the public realm, the architects Muf worked closely with the museum to design the new permanent gallery *Wonderlab: The Staitoi Gallery*. Our principal interactive space wowed design critics by making its architecture an exhibit in itself (see page 12).

An equally astute appointment of a world-renowned 'starchitect' saw the maths graduate Zaha Hadid breathing her vision into *Mathematics: The Winton Gallery* (see back cover). When it opened in December as the late Dame Zaha's only permanent public museum exhibition anywhere in the world, mathematics became global news.

The Science Museum Group's first Masterplan project to open outside London is the Ab Rogers-designed *Wonderlab* for Bradford's National Science and Media Museum (see page 8), where it offers a greater understanding of sound and light in a space that provokes discovery, discussion and hands-on activity. It also hosts the first 'Science on a Sphere' outside the capital, showing the dynamic surface of the Sun.

Competitive collaborations continue in future projects involving HAT Projects, Dow Jones Architects, Duggan Morris Architects and WilkinsonEyre, who are developing the world's premier medicine galleries in London. In Manchester, Carmody Groarke is setting a new level of quality for both our estate and our exhibitions by perfectly marrying innovative design with the historic listed buildings at the Museum of Science and Industry (see page 16).

**Above:** The vision expressed by the architects Muf for *Wonderlab* was crucial to its success

# CARING FOR THE WOUNDED MILLIONS



**'One of the best educational visits we have ever been on'**

John Linkins, Batley Grammar School

**Above:** *Ambulance Trains* at the National Railway Museum explores how the wounded of the First World War were transported and cared for  
**Below:** Conserving the Science Museum's First World War collection

During the First World War, 10 million combatants were killed, but twice that number were wounded and millions were left disabled, disfigured or traumatised by their experiences. For medical personnel on the front line, on ambulance trains and on the domestic front, the challenges were immense.

Millions of the sick and wounded were transported from the front by train to hospitals across Europe and the UK. *Ambulance Trains* is a new permanent exhibition at the National Railway Museum exploring this untold story through the experiences of those who travelled on board. A 1907 railway carriage of the type used in ambulance trains has been transformed into an immersive re-creation of these 'hospitals on wheels', inspired by the moving accounts of patients, nurses and medical orderlies. One visitor commented: 'The quality of the restoration project itself has been more than matched by the creativity that has gone into bringing the story alive ... I found myself completely absorbed in it.'

A secondary schools programme, including an innovative theatrical experience and interactive show, delved into the complex running of the ambulance trains and the lives of the staff and passengers. The activities have proved popular with students and teachers such as John Linkins (head of history at Batley Grammar

School), who said: 'The students (who are not normally easy to impress) were awestruck by elements of the day yet in others they could let their hair down and enjoy the "fun" side of learning.'

## Parallels with today's conflicts

In June 2016 the Science Museum opened *Wounded: Conflict, Casualties and Care*, a new exhibition marking the centenary of the Battle of the Somme and the enormous challenges for medical practices and technologies that resulted from this new kind of industrialised warfare. At the centre of the exhibition, which runs until January 2018 and was supported by the Heritage Lottery Fund, is a remarkable collection of historic objects from the Science Museum's First World War medical collections, illustrating the stories of the wounded and those who cared for them.

The *Wounded* exhibition team also worked closely with two UK charities that were formed during the First World War, today known as Combat Stress and Blind Veterans UK. The team also participated with recent veterans diagnosed with PTSD to co-create parts of the exhibition, both to draw out parallels with medical challenges faced today and to share the experiences of soldiers in more recent conflicts.

**VIEW THIS**  
[firstworldwar.nrm.org.uk](http://firstworldwar.nrm.org.uk)  
[blog.sciencemuseum.org.uk/tag/wounded](http://blog.sciencemuseum.org.uk/tag/wounded)



## LEARNING: A GROUP ENDEAVOUR



# IGNITING CURIOSITY ON A GRAND SCALE

Focus on the group's expertise in informal learning

For the UK economy to thrive, policy-makers, industrial leaders and educators agree that future generations must be informed, enthusiastic and skilled in science, technology, engineering and maths (STEM). The Science Museum Group has a distinctive and critical role in addressing this priority as a national and global leader in STEM education. Our impact as the most visited set of museums in the UK by school groups, combined with strengths in teachers' professional development and millions of public visitors, places us in a unique position within

the UK's learning ecosystem. In the past financial year we received another record-breaking total of 612,000 visitors in booked education groups.

### Research into practice

The group is pioneering the use of 'science capital' as a concept – a person's scientific literacy, their familiarity with science in daily life and some appreciation of science's worth – and this lies behind our efforts to enrich people's lives as well as enhance their contributions to society. Enterprising Science, a five-year

partnership with King's College London and BP, is due to complete at the end of 2017. Our other research-into-practice project is Building Bridges, a partnership between the Science Museum and Shell, also in its fifth year. The project sets out to inspire young people from diverse backgrounds, encouraging them to explore STEM subjects and career paths.

**Above:** The Building Bridges project gets students hands-on with STEM

## LEARNING: A GROUP ENDEAVOUR



'The kids knew what to expect, they were genuinely looking forward to the day because they had seen the quality of the presentation in school'

Teacher



**Right:** STEM ambassadors in our northern powerhouse... Experiments at the Chemistry Bar in Wonderlab... Google's 'A Day at the Museum' event at the National Science and Media Museum

### A northern STEM powerhouse

The group now runs one of the largest networks of STEM ambassadors outside London from the Museum of Science and Industry. In mid-2016 the national administration and funding were restructured and existing contract-holders were invited to bid for bigger regional contracts. We saw the opportunity to create a STEM powerhouse by uniting all three of our northern museums to make a bid for the trans-Pennine area – Greater Manchester, West Yorkshire and North Yorkshire, encompassing over 2500 ambassadors. The strength of our museums as a group enabled us to submit a strong bid which won the contract late last year, and new staff are now in place and working hard to build up the ambassador network across the region.

### VIEW THIS

[msimanchester.org.uk/stem](https://msimanchester.org.uk/stem)

### A group-wide funding opportunity

We are now in the third year of being a funded partner for Google's 'A Day at the Museum' project where primary schoolchildren meet real scientists with the aim of challenging stereotypes. We have extended this across the entire group, to target schools who haven't visited us before.

### Party on with the family

Our newly recruited business manager for learning has been busy creating a novel children's party event for the Science Museum. Families can book a fun educational experience for their children and friends in one of the coolest places to celebrate getting older. Each party generates a contribution to the museum and we will be rolling out more across the group.





# REACHING OUT, EXPANDING ACCESS FOR ALL

This year the Science Museum again exceeded all previous records to welcome 460,300 booked education visitors. We remain the most visited museum in the UK by school groups

**Reaching out into your community**

The group also delivered training to 622 teachers and educators, and 291 scientists and STEM experts who work with student and family audiences. We have reached 88,700 children beyond the Science Museum through outreach visits to schools, festivals, community groups and corporate partners. This included a second year of Science Weekenders at three Butlin’s sites as part of their schedule that attracts 100,000 visitors each year, as well as taking part in high-profile events such as the Shell Eco Marathon at the former Olympic Park, the Royal Institution’s Girls in STEM event and the Farnborough Air Show. The team visit about 150 schools across London and the UK.

**Website tests your child’s curiosity**

What would life be like without electricity? Can you lift something heavier than yourself? These are among Seven Questions to Explore Before You Leave Primary School, a collaboration between the Science Museum, TES and the Arts Council designed to provide inspiration for cross-curricular learning. We see that imagination is a foundation of both arts and sciences, and so the videos on the project website invite young people to help answer big questions using their curiosity, creative thinking and problem-solving skills through STEM, arts and humanities subjects.

**Accessibility for all**

Our programme for young visitors on the autistic spectrum and their families – generously supported by Lord and Lady Wolfson’s foundation – goes from strength to strength. *Wonderlab: The Statoil Gallery* proved extremely popular with the audience for Early Birds (for ages 6–15) and we offered Night Owls (for ages 16–25) for the second year running. During the year 1400 visitors came to these events.

For our deaf and British Sign Language adult audiences we tried an innovative approach to attract greater numbers: we devised a training programme for our three deaf presenters that would enable them to write their own tours. This has been hugely



**‘It is especially nice to see other adults engage with our children and explain concepts and take their understanding of the world further on’**

Home educator



successful and reached more visitors including many repeat visitors. Our BSL programmes attract 1200 visitors across several platforms each year.

**TEDxLondon**

In 2016 we held the TEDxLondon series. Hosted by Lauren Laverne, two events in our IMAX featured speakers ranging from Al Murray to Stephen Hawking. Both events sold out instantly. The live stream footage was viewed nearly 3000 times during the event, while 1000 tweets on the day reached over 3 million accounts and the talks have been watched online 300,000 times to date.

**‘Flash mob’ in the museum**

In May we surprised Science Museum visitors with an impromptu performance of parts of Holst’s *The Planets* by a 90-piece orchestra made up of Royal College of Music students. This ‘flash mob’ was the latest event in a long museum tradition of exploring music and sound. The film of the event has been watched 36,000 times and continues to delight audiences around the world.

**Opposite:** Royal College of Music students bring Holst’s *The Planets* to the Science Museum in a ‘flash mob’  
**This page, from top:** Pupils from Christ Church Academy, Bradford, at the National Science and Media Museum... Outreach weekend at Butlin’s... Comedian Steve Coogan speaks at TEDxLondon

**VIEW THIS**  
[tes.com/7questionstoexplore](https://tes.com/7questionstoexplore)



## LEARNING: A GROUP ENDEAVOUR



# A POWERFUL INFLUENCE ACROSS THE NORTH

## IN YORK FUTURE ENGINEERS MEET THE PROFESSIONALS

Focusing on the E of STEM, an ambitious programme to showcase engineering at the National Railway Museum has been devised by our new head of learning and events, Lynne Minett, who signals the integration of local learning into our group-wide strategy. The museum piloted its Future Engineers programme to add contemporary appeal for schools and families. This explored current railway engineering topics through hands-on events and meeting rail industry professionals. Across Key Stages 2 and 3 age groups, 17 schools and 640 pupils attended, as did families during October half term. Drawn from 12 different rail companies, 40 engineers contributed 340 hours. Meanwhile the learning programme at our Shildon museum, Locomotion has expanded to reach adults with learning disabilities and senior citizens.

## MANCHESTER THRILLS THROUGH STORIES

The tale of British aviators Jack Alcock and Arthur Brown making the first non-stop transatlantic flight in 1919 is one of the immersive stories for the young being told by the learning team in Manchester's Museum of Science and Industry. So unveiling the new show area in the Air and Space Hall was an important move to transport our visitors across the world and through space and time.

In Seeing Sounds, students explore the concept of sound waves in a cross-curricular, creative context, recording engine sounds and mixing them into music, before blasting them through a Rubens tube – a flaming visualisation of sound waves. The Pi: Platform for Investigation left the museum for the first time to visit the Manchester Arndale, where visitors could swap shopping for interactive experiments with nanoscience researchers

from the University of Strathclyde, in Glasgow. Two more firsts: the explainer team took to the 1830 Express steam ride, while tinkers, tailors, crafters and coders took over MakeFest, run solely by the museum for the first time.

Accompanying the *Wonder Materials* exhibition, a large breakout area of hands-on activities makes the graphene exhibition engaging and accessible for Key Stage 3 children.

**Above:** The Future Engineers programme at the National Railway Museum  
**Opposite:** Enterprising Science course for teachers at the Museum of Science and Industry... Pi: Platform for Investigation at Manchester Arndale... Bradford's busking explainers use iPads on-gallery when chatting to visitors

## LEARNING: A GROUP ENDEAVOUR

### BRADFORD ADOPTS BUSKING

#### Instant info for families

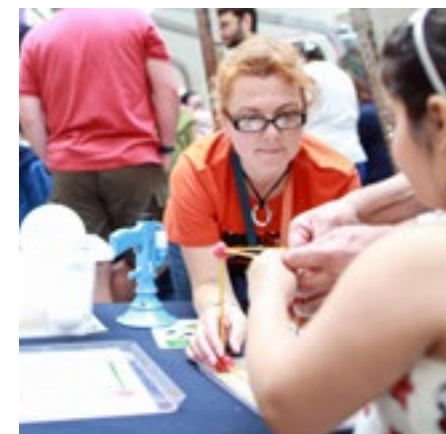
Busking enabled our explainers at the National Science and Media Museum to tailor the learning experience to wide-ranging audiences during the summer. By roaming all galleries and public spaces armed with iPads, loaded with apps, games and quizzes, they could provide a more inclusive and flexible service for visitors.

### Balancing the gore kids love

The sheep's eye dissection workshop has provided the perfect balance between gore and science, which kids love. The learning programme for education booked groups now enables them to experience science in ways they wouldn't in the classroom. Coincidentally, the number of education groups grew this year from 30,200 in 2015–16 to 33,600.

### Growing new audiences

The pilot Bedtime Stories welcomed 1500 children and parents in the hours after school. We have partnered with Police Camps, a school holiday programme established by the emergency services to support young people identified as being at risk of antisocial behaviour during the school holidays. This year we welcomed 1200 children from the camp.



## 'Wonderlab lets teachers do what can't be done in the classroom. This is learning by stealth'

Vicky Clifton, head of learning at the National Science and Media Museum

### VIEW THIS

[nrm.org.uk/education/nrmyork](http://nrm.org.uk/education/nrmyork)  
[msimanchester.org.uk/schools](http://msimanchester.org.uk/schools)  
[scienceandmediamuseum.org.uk/learning](http://scienceandmediamuseum.org.uk/learning)





'These mesmerising mechanical creations from the past 500 years reveal so much about humanity's hopes, fears, dreams and delusions'

Ian Blatchford, director of the Science Museum Group

# ROBOT ROUNDUP WOWS THE CRITICS

Four years in the making, the Robots exhibition opened in February to rave reviews. The Guardian pronounced Robots as a 'trove of delights', The Times called it 'a bold and compelling show' and WIRED praised the 'effort and thought that has been put into the Robots collection'. By the end of April almost 100,000 people had visited the exhibition, which runs until September 2017. It is booked for five years of international touring

Exhibition centrepiece: A carousel of vintage 'tin-can' robots includes the Humanoid Sitting Robot, Cygan, George and Eric (in his 2016 reincarnation)



# HUMANOIDS UPSTAGE THE HUMANS

Our *Robots* exhibition explores humanity's 500-year quest to reimagine ourselves – not through paintings or sculpture but as machines arising from religious belief, the industrial revolution, popular culture and dreams about the future.

From the most significant collection of humanoids ever assembled, curator Ben Russell contrasts the attributes of the six most important: 'Cygan epitomises everything you dream a robot to be, while Terminator T-800 combines all your worst robot nightmares brought to life. The Automaton lathe is a 364-part jigsaw that took 16 weeks for us to rebuild. Shadow Biped is one of the first robots outside Japan that could stand and take a step. ROSA is a robot whose design intimately mirrors human anatomy and RoboThespian, the robot actor, is the only one you will meet which speaks Klingon.'

**Right:** In *Robots Revealed*, the University of Hertfordshire's robot football team (The Bold Hearts) practised for the 2017 Robocup tournament in Japan while robotics engineers gained valuable insights

**The Last Supper:** An atmospheric robotic art installation by kinetic artist and sculptor Giles Walker featured 12 robotic figures drinking, smoking and discussing sin, forgiveness and guilt as part of a 13-minute performance

In May 2016, the Science Museum launched a crowd-funding campaign through Kickstarter to recreate Eric for the *Robots* exhibition. Eric was the UK's first robot, built in 1928 by Captain William H Richards and Alan Reffell, and was a talking, moving mechanical person who amazed crowds across the UK and the USA. Then he mysteriously disappeared. Thanks to the generosity of 861 backers from across the world, the Kickstarter campaign raised £50,000 in a month, enabling the museum to bring Eric and a second robot, Inkha, back to life. Naturally, both star prominently in our exhibition.

A thought-provoking event programme running in parallel with *Robots* helped attract a number of new and returning funders. These included past partners, such as Heritage Lottery Fund, EPSRC, the Swiss Embassy and the Royal Academy of Engineering, and new funders, including livery companies and charitable foundations.

Later in 2017 *Robots* moves north to headline the Manchester Science Festival.

**'Our workshop team are the world experts in robots after installing this exhibition – nowhere else can beat us'**

Steve Long, head of gallery services

## VIEW THIS

[sciencemuseum.org.uk/robots](http://sciencemuseum.org.uk/robots)  
[sciencemuseum.org.uk/eric](http://sciencemuseum.org.uk/eric)  
[blog.sciencemuseum.org.uk/eric-goes-on-display](http://blog.sciencemuseum.org.uk/eric-goes-on-display)  
[youtube.com/watch?v=UjgDvymekk4](http://youtube.com/watch?v=UjgDvymekk4)  
[sciencemuseum.org.uk/last-supper](http://sciencemuseum.org.uk/last-supper)



**Above:** *Robots* lead curator Ben Russell with artist Giles Walker, who rebuilt Eric, Britain's first robot... The graceful Silver Swan, a unique musical automaton from 1773 loaned to the exhibition by the Bowes Museum in County Durham



**Pepper**, shown above at the press launch of *Robots*, is an autonomous talking humanoid robot which can be programmed to perceive emotions and adapt its behaviour to the mood of the humans around it

**Robo-host fronts comedy quiz:** Paranoid Androids and Electric Sheep was the world's first comedy quiz show to be hosted by a 'real-life' robot and put special guest RoboThespian centre stage in our IMAX theatre

**Another first in robot surgery:** Imperial College's Roger Kneebone hosted a rare treat as robotic surgery pioneers Ara Darzi and nurse practitioner Shirley Martin together recreated the UK's first keyhole surgical procedure which used the da Vinci robot (pictured), first performed in 2000







**‘We can bring science evoking strong passions to a huge audience thanks to our alliance of partnerships’**

Antonio Benitez,  
Manchester Science Festival director



# TENTH BIRTHDAY PARTY FOR 136,000 GUESTS

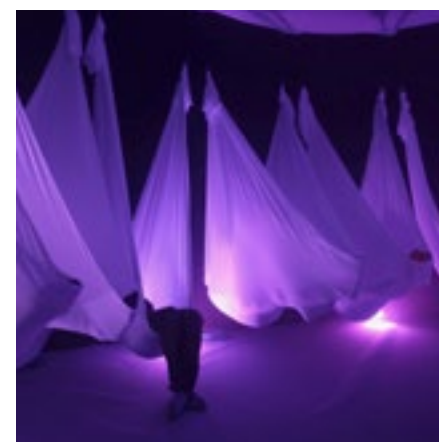
Cake, chocolate and magic played their parts in the tenth birthday celebrations for the Manchester Science Festival – all in the name of scientific experimentation, of course. And as the best birthday gift for the team behind the festival, visitor numbers reached a record high of 136,000 attendances by families and adults. The 125 bold and playful events across the city involved 1000 scientists, artists and researchers.

Astronaut Tim Peake blazed a trail by giving eager family visitors to his sold-out show the chance to quiz him on his weeks spent in space. The event was also live streamed across the museum site and online. Over the 11 days of the main festival, headline activities included the Chronarium – a sleep lab in the Manchester Arndale, which investigated how shoppers could reset their circadian rhythms and which the *Manchester Evening News* praised for ‘allowing visitors to ditch the madness

of the high street’. A live performance by Public Service Broadcasting of their album *The Race for Space* was preceded by a question-and-answer session with Jodrell Bank’s Tim O’Brien, and an original art installation commission, *Cloud Crash*, was inspired by data from the Natural Environment Research Council.

There was a performance by the Robot Orchestra while elsewhere food lovers learned how microorganisms add flavour to their meals, and a special screening of *Harry Potter and the Philosopher’s Stone*, complete with afternoon tea, saw group director of external affairs Roger Highfield explain the science behind the magic. This year’s festival was supported by headline sponsor Siemens, educational sponsor the University of Salford and sponsors Waters and United Utilities.

**VIEW THIS**  
[manchestersciencefestival.com](http://manchestersciencefestival.com)



**Clockwise, from top:** CBBC presenter Ricky Boletto poses for a selfie with Tim Peake... The Robot Orchestra... The Chronarium sleep lab at the Manchester Arndale

# A POTENT PLATFORM FOR WIDESCREEN TALENT

The 20th Widescreen Weekend festival connected the past, present and future of cinema technology through a unique programme of film screenings and guest events in the Pictureville Cinema at Bradford’s National Science and Media Museum. The festival projection team were challenged for another year to exhibit a range of film formats from 70 mm and 4K digital to the skilfully synchronised three-projector Cinerama.

The widescreen programme included two new Cinerama restorations – the world premiere of *Cinerama’s Russian Adventure* and the European premiere of *The Golden Head*, plus an interview with its star Jess Conrad. Celluloid titles included *Aliens*, *Vertigo* and *The Agony and the Ecstasy* in 70 mm and a three-strip presentation of *This is Cinerama*. Bond girl Jenny Hanley appeared in conversation before a screening of *On Her Majesty’s Secret Service* and the festival debated widescreen cinema in the age of VR.

This year’s festival introduced a student day with a low-priced pass and a programme to suit both delegates and undergraduate cinematographers. This day incorporated our third Student Widescreen Film of the Year Competition and showed an impressive selection of student films from a record 510 entries. One of the finalist films in the 2016 student competition, *A Love Story*, recently won the BAFTA for best short animation, proving the occasion to be a potent platform for emerging talent.

The festival attracted many international guests and delegates travelling from as far as California and Melbourne. Admissions for Widescreen Weekend continued to grow this year, up by 3% compared with 2015.



**Top:** Director of BCB Radio Mary Dowson in conversation with Bond girl Jenny Hanley  
**Above:** A panel of experts debate the pros and cons of virtual reality cinema  
**Left:** Cultural historian Christopher Frayling introduces *The Agony and the Ecstasy*



# SCHOLARS HOME IN ON OUR RESEARCH CENTRE

Tim Boon celebrates 20 years growing a meeting of minds



**'Our museums in Manchester, Bradford and York have created our own northern powerhouse – and our research centre in London is driving our reputation for research'**

Dame Mary Archer, chairman of the group's Board of Trustees



**VIEW THIS**  
[sciencemuseum.org.uk/arr](http://sciencemuseum.org.uk/arr)  
[journal.sciencemuseum.ac.uk](http://journal.sciencemuseum.ac.uk)

2016 was the year that the Science Museum's research enterprise truly became visible, via its new home at the Dana Research Centre and Library. In addition to a stream of seminars, workshops and smaller conferences, we held two major three-day events: Alternative Histories of Electronic Music in April, and Artefacts in October. The electronic music conference, the fruit of our partnership in an AHRC-funded research project conducted by James Mooney at the University of Leeds, featured three packed days of papers and performances, contributing insights to the Museum's planning for a future music and science exhibition. A special issue of the journal *Organised Sound* in 2017 is the most visible outcome of this meeting, which has established a substantial research community that is already planning new activities.

The 21st meeting of Artefacts brought museum colleagues and scholars from across the world to discuss the theme 'Understanding Use: Science and Technology Objects and Users'. This growing collaboration, initially an alliance of the Science Museum Group with the Deutsches Museum and Smithsonian Institution, has met in different museums every year since the first gathering at the Science Museum in 1996. Every year new museums want to join, and around half of the meetings produce a highly illustrated volume of essays that thematically illuminate science collections worldwide.

The conference saw the premiere performance of Jean-Philippe Calvin's new score for the 1928 film *The Building and Operation of Industrial Museums*, the outcome of an artist-in-residence project funded by the Leverhulme Trust. The film was made by proponents of a proposed



new science museum in New York City and shows scenes from the Science Museum, Musée des Arts et Métiers in Paris, Deutsches Museum in Munich, and the Technical Museum, Vienna. The new piece also featured at the Manchester Science Festival.

The research department has welcomed the first two Wellcome Trust secondment fellowships; Jo Hedesan and Ayesha Nathoo have contributed their historical expertise to planned future exhibitions on, respectively, the Sun and ideas of immortality. They have become part of the research community at the research centre, interacting with our staff and AHRC-funded collaborative doctoral students.

The research and public history department has launched an Annual Report in which our research community – fellows, associates, staff and students – write about the many exciting research projects under way across the group.

We have now established a virtuous cycle in which the different strands of research activity mutually support each other: the research projects, fellows and students not only generate fresh thinking for museum displays, but also lead to conferences that, in due course, produce articles for the *Science Museum Group Journal*. The journal in its turn exemplifies the sectoral leadership that the group seeks to provide to technical museums worldwide. We welcome contributions from scholars, curators, conservators and educators who share the group's broad interests in the role of today's museums and collections.

**Opposite:** Collaborative doctoral partnership students Gemma Almond, Caitlin Doherty, Jacob Ward, Caroline Avery and Tom Ritchie pose with props related to their studies

**This page, clockwise:** The *Science Museum Group Journal*, freely available online... Ayesha Nathoo, who is researching a future exhibition on immortality... Recently published Science Museum books... Electronic tide modelling machine, invented by Shizuo Ishiguro, the subject of an 'object biography' article in *SMGJ*... Premiere performance of the new score for *The Building and Operation of Industrial Museums*



# GLIMPSES OF OUR MUSEUMS' HERITAGE



**This page:** A British Railways poster from 1956 exemplifies findings from research by Anna Geurts and Oliver Betts... Anna Geurts examines reading lights in the National Railway Museum collection



**Travel as universal leveller**  
The National Railway Museum initiated a new academic collaboration this year. An award from the Yorkshire Country House Partnership and White Rose Consortium enabled Anna Geurts of the University of Sheffield's Centre for Nineteenth-Century Studies to undertake scoping research on travellers' visits to country houses. Examining guidebooks from the 1830s through to the 1980s, Anna and museum research fellow Oliver Betts found that from the very beginnings of the railways country houses had been prime visitor locations for rail travellers. The research demonstrated that, far from being 'high culture' and exclusive, these attractions were quickly marketed as of interest to all through cheap and popular texts, reshaping our ideas of cultural tourism.

**Manchester's rival to Kensington**  
There were celebrations for the Museum of Science and Industry with the news that collaborative PhD student Erin Beeston was awarded the University of Manchester University History Prize 2016 for an essay titled 'A science museum "to rival South Kensington": curating the "university city" and establishing the North Western Museum of Science and Industry'. Erin said: 'I was very interested to find real passion for the heritage of the city and region.' Erin is studying in the university's Centre for the History of Science, Technology and Medicine, with whom the museum has a valuable working relationship. Overall, group visits to the museum's collections



centre grew tenfold year on year – a huge success for the collections team, who have worked hard to attract higher-education groups.

**The explainer explained**  
This year Ceri Pitches, one of four collaborative doctoral students at the National Science and Media Museum, completed her PhD. Co-supervised by Michael Terwey at the museum and Mark Taylor-Batty at the University of Leeds, Ceri's project explored the role of the explainer – the members of learning teams across the Science Museum Group who give talks, demonstrations and lead activities on the floor every day. Ceri has focused on the ways performance skills and training have been passed on between successive generations. She has traced their lineage back through the museum theatre companies of the 1990s, the staffing of the first *LaunchPad* gallery in the Science Museum in the 1980s and the guide lecturers at the Science Museum in the mid-20th century. Key aspects of the explainer's role reach back to the pioneering science communicators Humphry Davy and Michael Faraday in the 19th century.

**This page:** The museum explainer's role has always required performance skills and here John Freeborn is giving a lecture demonstration in the Science Museum in 1971... PhD student Erin Beeston giving a talk at Manchester's Museum of Science and Industry



## SPOTLIGHT ON CHEMISTRY

Research by the Royal Society of Chemistry (RSC) shows that most people aren't aware of the huge variety of what chemists, chemical engineers and others in this field do. So we're teaming up with the RSC to use our world-class collections – spanning experimental chemistry, industrial chemistry, plastics and biochemistry – to raise awareness and understanding of the role and value of chemistry and the chemical sciences in society. Keep an eye out for more from Sophie Waring, the Science Museum's new curator of chemistry, courtesy of the RSC.



# PIONEER'S CAT BRINGS IN THE TODDLERS

Our Manchester team want to catch them young

The question of how we attract people who might feel museums are 'not for them' is not a new one – but recently Manchester's Museum of Science and Industry decided to put together a team to tackle the problem. They focused on Greater Manchester pre-schoolers, an audience segment that accounts for 13% of our visits and includes a high percentage of visitors from less advantaged backgrounds.

Bearing this research in mind, the team made My Den, a space attached to our *Textiles* gallery, into a welcoming place for these families, installed a soft play area in the interactive *Experiment!* gallery, added baby-change tables to bathrooms, and

made an emergency supply of nappies and baby wipes available at the front desk. The explainer team tested and piloted sensory play blanket bags and treasure baskets, and two 'play packs' for toddlers – the Power Pack to adventure around the Power Hall, including an oil can and train driver's hat, and the Pilot Pack for mini pilots visiting Air and Space with a mini Lucky Jim, the toy cat which flying pioneers Jack Alcock and Arthur Brown took on the first non-stop transatlantic flight in 1919. The visitor experience team were instrumental in this project, from developing a resource-pack lending system to collating feedback to cajoling small kids into giving train sets back.

The project was launched at a Tiny Takeover on 25 November 2016, a special day focused on pre-schoolers. To ensure the widest possible participation the team contacted Sure Start centres, meaning families attended who had never been before, and many of the regular families loved the new spaces and activities. Feedback after the event was positive, and demonstrated that by working together it was possible to make families with young children feel welcome – work which will be built on by museum teams in years to come.

**Below:** A young flying ace enjoys the Air and Space Hall with his own Lucky Jim toy at an Experitots event



## HOW TO SURVIVE CONNECTIVITY

**'Big data is still new but it is already revolutionising the world around us'**

Sheldon Paquin, exhibition developer

Big data is having an ever greater impact on our lives, from making our daily commute run more smoothly to improving the design of children's toys. With 90% of all available human data having been recorded in the past two years, the Science Museum exhibition *Our Lives in Data* explored some of the diverse and transformative ways that information is being collected, analysed and used, and considered the consequences of living in a more connected world.



The display in the new *Tomorrow's World* gallery – rebranded to mark a partnership with the BBC, Royal Society, Open University and Wellcome – also examined the crucial role of big data in medical science. Human DNA sequencing first took about 13 years to complete but is now done in just two days. An example of a modern DNA sequencer on display is helping the 100,000 Genomes Project to uncover the causes of rare diseases and cancer.

Visitors could also test facial recognition software and see new virtual reality tools

created to help researchers understand vast collections of data. Other highlights included some of the new products developed to help individuals protect their data, such as a Cryptophone which prevents access to your mobile phone and paint that blocks Wi-Fi signals.

*Our Lives in Data* was generously supported by Lloyd's Register Foundation (principal funder), PwC (major sponsor) and Microsoft (associate sponsor). We were delighted to bring these new partners on board during the year as our work complements their strategic priorities.

### Fashion meets science

A display of Helen Storey's unique *Dress For Our Time* in August used fashion and data science along with a decommissioned UN refugee tent as an artistic interpretation of the vast numbers involved in refugee migration around the globe.

**Top:** *Our Lives in Data*'s interactive quiz asks visitors how they think data should and shouldn't be used  
**Left:** Helen Storey and her *Dress For Our Time*



# MANY COLLECTIONS CREATE ONE GLOBAL RESOURCE

Across the group, this has been the first full year of implementing the bold decision to manage the collections as a single resource. Already, sharing skills and expertise between sites is producing real wins, with colleagues working more closely than ever before

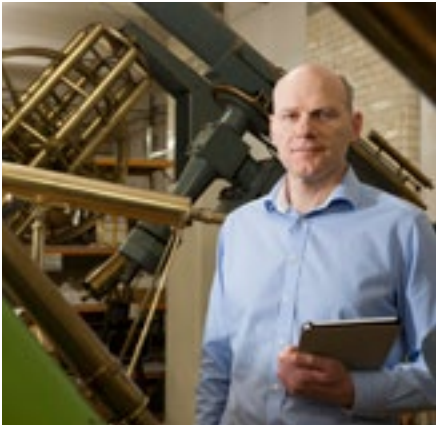
## New era for digitisation

To meet the challenge of getting most of the collection online, the group has appointed a new digitisation manager, Adrian Hine. He leads newly created national teams covering documentation of the collection and imaging, which are expected to grow over the next few years as digitisation projects take place.

‘Traditionally digitisation was thinking about our own internal needs to catalogue and know about the objects, archives and pictures,’ Hine says. ‘Increasingly it’s about making that knowledge available to the outside world. We have to make our database records consumable and relevant. We’re adding good-quality images, and in the future 3D images, to give the public a different impression of our objects.’

‘A few weeks ago I went down to the basement of our stores at Blythe House, a labyrinth of rooms. Most of this is hidden away. To be able to open that up and make it accessible to the whole world really excites me.’

In the photo studio, manager Kira Zumkley and her team have been experimenting with enhanced digital photography. Objects in the *Robots* exhibition have been photographed from each of 360 degrees, resulting in a rotating animation. ‘The challenge was to switch to thinking about a rotational image that has to look good in all three dimensions,’ Zumkley says. This kind of imaging will be a feature of future projects.



**Clockwise, from top:** Digitisation manager Adrian Hine... Panorama for VR app of the stunning new *Mathematics* gallery, a superb showcase for our collection... Conservators Emily Yates and Sophie Oelman prepare objects for the *Robots* exhibition



## Collection website goes live

Anybody with an internet connection can now read the notebooks of computing pioneer Charles Babbage, following the launch of the Science Museum Group Collection website. Accessible online for the first time, the Babbage Papers contain rich historical evidence including detailed plans for the mathematician’s Analytical Engine. A reconstruction of Babbage’s Difference Engine No. 2, built by the Science Museum in the 1980s, has proved a star on display, and evidence of the viability of his original plans.

The collection website forms a central plank of the group’s digital strategy. In just

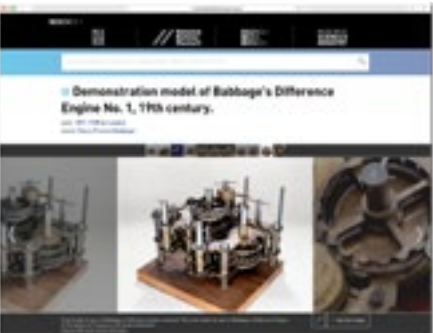
over a year a hardworking team has put together the new site. ‘This is the first time that everything has been together in one place,’ says John Stack, digital director. ‘It’s really fast, the pictures are big and beautiful, and we will continue to build on this, adding new features and functionality.’

The new site makes it easy to search or browse for objects and archives, from early Kodak Brownie cameras to the iconic steam locomotive *Mallard*. ‘It’s an outstanding and well-presented resource,’ comments Marius Kwint, reader in visual culture at the University of Portsmouth.

Images and data can be creatively reused

for non-commercial purposes thanks to generous Creative Commons licences, and there are links to buy prints or license images commercially from the group’s Science & Society Picture Library. Only a fraction of our vast collection is available in this first web release and speeding up digitisation of the collections is vital. The website infrastructure has been designed to scale up to cover millions of records, but making more of the collection accessible online will be an ongoing task.

**VIEW THIS**  
[collection.sciencemuseum.org.uk](http://collection.sciencemuseum.org.uk)



**Above:** The new Science Museum Group Collection website, here showing one of Babbage’s models for his Difference Engine No. 1





# A JIGSAW PUZZLE FOR CONSERVATORS

**‘Increasingly digitisation is about making knowledge available to the outside world. We have to make our database consumable’**

Adrian Hine, group digitisation manager



Conservation teams across the group continue to support increasingly ambitious exhibition projects. A highlight of the year was the reconstruction of the ornate Automaton lathe for the *Robots* exhibition. The lathe entered the collection in 1872 and had been stored in 364 pieces for more than a century. The complete lathe and supporting wooden frame towers 2.5 metres tall (9 feet) and was reassembled in a collaboration between group conservators, curator Ben Russell and external specialists Richard Rogers

Conservation, all with the generous support of our patrons.

The team set out painstakingly to clean every piece before putting them back together again. Kate Perks, senior collections care conservator, says: ‘The best part was seeing the jigsaw puzzle of pieces, with only one grainy photo from 1906 as reference, put together into the glorious object that it is now.’

Masterplan projects to transform our

five museums occupy significant time. In Manchester, 600 objects, including very large early computers and electrical machinery, were decanted from tired old galleries. They make way for construction of the new Special Exhibition Gallery. In London, work took place late into the night to hoist the ‘Gugnunc’ biplane into place as the spectacular centrepiece of the new mathematics gallery.

The highly skilled conservation team has had numerous other projects to tackle.

In Bradford, painstaking work to remove harmful adhesive tape from a photograph album exemplifies the work undertaken on hundreds of photographic items, ensuring that they can safely travel to exhibitions around the world.

At Locomotion in Shildon, the great treasure of the historic railway site, the 1829 locomotive *Sans Pareil*, has been relocated into the main museum building so that more visitors will find it. In York, a drawing table used by engineer George

Stephenson was conserved by University of Lincoln student William Bratley, providing him with invaluable practical experience.

As the museums collaborate more closely on exhibitions – *Robots* tours to Manchester in autumn 2017 – so the future will be built upon the foundations of cross-group working laid this year.

**Clockwise:** Metalwork specialist Julia Tauber and *Robots* curator Ben Russell with the Automaton lathe... Student intern Anjali Jain assists with the decant of objects from the old first-floor displays in the Science Museum... Sadie Wilson working on her condition report for the Soyuz capsule cabin... Installing the Soyuz parachute proving a tricky task

**VIEW THIS**  
[collection.sciencemuseum.org.uk](http://collection.sciencemuseum.org.uk)



# SCIENCE AFTER HOURS IS BUZZING



Spin-off events from headline exhibitions are proving a huge draw with celebrity speakers lighting up evenings in our museums

## Star names a-glitter

Among the global ambassadors for STEM who appeared on recent group platforms were billionaire philanthropist Bill Gates and Grammy-award-winning musician and advocate for education will.i.am. Introduced by group director Ian Blatchford, they impressed a packed audience who included entrepreneur Martha Lane Fox, broadcaster Jim Al-Khalili and CEO of Cancer Research UK Harpal Kumar. The event – which was viewed 250,000 times during a Facebook Live broadcast – launched an all-adults Lates evening helping to celebrate the \$1 billion Grand Challenges programme of the Bill

& Melinda Gates Foundation that seeks solutions to the most vexing problems in health and development.

## Prince Charles heads party-goers

The *Evening Standard* held its tenth celebration of London's most influential people – the 'Progress 1000' – at the Science Museum, attended by a glittering array of party-goers including the Prince of Wales, mayor of London Sadiq Khan, *Evening Standard* proprietor Evgeny Lebedev, president of the Royal Academy of Engineering Ann Dowling, actors John Malkovich and Joanna Lumley, and Mercury Prize-winner Benjamin Clementine.

## Bridging the two-cultures gap

With the Royal Society, the *Standard* also supported the annual 'Scientists Meet the Media' party at the Science Museum, marking the 25th anniversary of the first gathering staged to foster mutual understanding between professional commentators and those who work in Britain's laboratories. Guests included Royal Institution Christmas lecturer Saiful Islam, master of Churchill College Cambridge Athene Donald, head of BBC Science Andrew Cohen, Alok Jha from ITV News and Oliver Morton of the *Economist*.



**'London is open to the greatest scientific minds and the Science Museum tells the extraordinary story of why we lead the way in innovation'**

Sadiq Khan, mayor of London

**Opposite:** will.i.am and Bill Gates take part in the *Evening Standard's* Progress Conversation with editor Sarah Sands at the Science Museum



## Victory to the games player

The power of games to excite the public was forcefully demonstrated by Play It! in 2016 at Manchester's Museum of Science and Industry. Its popularity triggered the gaming festival rebranded as Power UP! in London where 37,000 visitors relished getting hands-on with 40 years' worth of games, plus consoles past and present. The learning team programmed coding workshops especially for the occasion and have since expanded them for after-school audiences. Across the two sites these immersive gatherings contributed £148,000 income to the group.

## IMAX epics exclusive to us

As part of our commitment to expanding audiences, the IMAX theatres at the National Science and Media Museum and the Science Museum both screened the blockbuster *Rogue One: A Star Wars Story*. A stunning new 3D film, *A Beautiful Planet*, thrillingly dramatises life aboard the International Space Station and has proved our most successful educational title.

## Birth of a space-woman

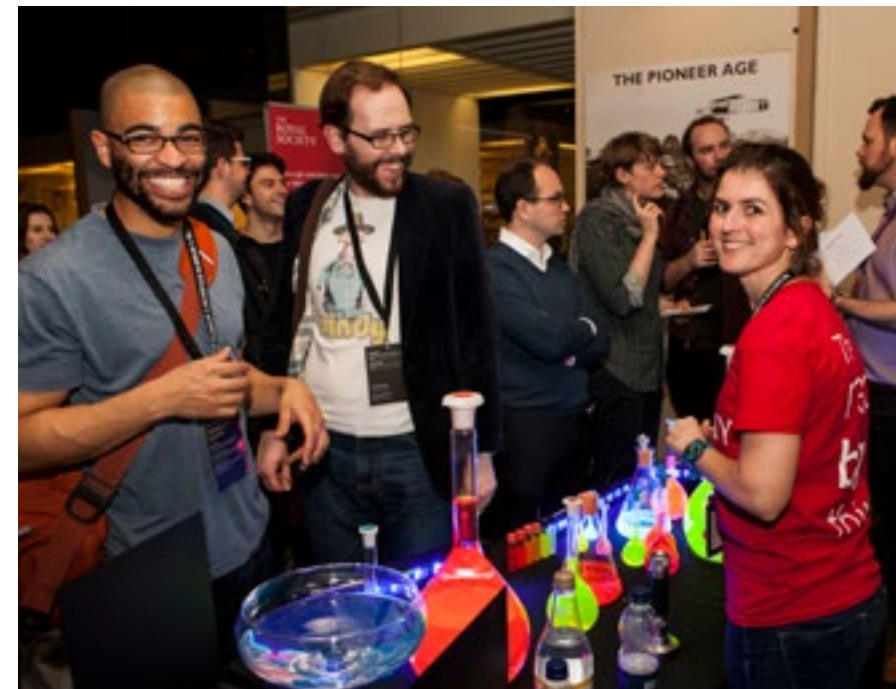
The Science Museum also saw 12 astronauts from the Association of Space Explorers celebrate the silver anniversary of Helen Sharman becoming the UK's first astronaut. In our IMAX theatre she described the fairy-tale story of how her launch on 18 May 1991 ultimately dated back to 1989 when she, as a food technologist, answered an advertisement: 'Astronaut wanted. No experience necessary.' There were also tributes to Helen from Buzz Aldrin and Brian Cox.

**This page, from top:** Interactive console ring for gamers at the hugely popular Power UP! festival at the Science Museum... Celebrating the 25th anniversary of the first Briton in space in the Science Museum's *Exploring Space* gallery, Helen Sharman is seen with her Zvezda spacesuit made by Sokol and worn on board the Soyuz TM-12 and Mir spacecraft... Mary Archer and Ian Blatchford meet mayor of London Sadiq Khan and artistic director of the Southbank Centre Jude Kelly at the Progress 1000 event



# LATES TICK THE ADULT BOXES

All our museums have raised the bar with adults-only Lates events that attract distinguished scientists and thoughtful audiences



**Left:** Live music set the National Railway Museum rocking at its special Lates event celebrating *Flying Scotsman*'s national tour

**Above:** The 'gin-and-tonic' bar at the Science Museum Lates, sponsored by the Royal Society and dedicated to discovering The Next Big Thing

**Above right:** Bradford's National Science and Media Museum devoted one Lates evening to the latest ideas in wearable technology



## A host of Next Big Things

Tipplers learned how their gins and tonics help the fight against autoimmune diseases when the Royal Society took over a Lates evening at the Science Museum showcasing some of the best research from leading UK scientists. The journey to discover The Next Big Thing saw visitors generate electricity from walking, see through the eyes of a cuttlefish, race solar bugs, sculpt within the nano-realm, detect synthetic speech, learn about photo-elasticity, distinguish meteorites from stones and read zebra stripes as bar codes. Howzat!

## The young want nostalgia

The first Lates event in the National Railway Museum's *Flying Scotsman* season was 1920s themed and backed musically by the Leeds City Stompers. It was also designed to benchmark evening audiences who mainly consisted of young 'nostalgia seekers' aged 16–24, a third of them students in York. This is the exact reverse of our usual daytime audience and will influence future programming.

## Graphene as the new Lego

Manchester's Museum of Science and Industry held its busiest Lates event yet during the EuroScience Open Forum (ESOF), when 1000 people came to explore the theme of 'Science in the City'. Another event marking the launch of the exhibition *Wonder Materials: Graphene and Beyond* brought Nobel laureate Andre Geim into conversation with the group's Roger Highfield. The renowned scientist likened working with graphene to playing with Lego, but instead of bricks using atom-thick plates. He told the audience: 'We have moved through many different ages – iron, bronze, silicon – and many people now believe that we are at the beginning of the age of two-dimensional materials.'

## Insider view of genetics

The after-hours programme at Bradford's National Science and Media Museum aimed at young adults by collaborating with local organisations – Bradford-based medical visualisation company iGene gave visitors a sneak preview of the world's only non-invasive digital autopsy technology... A new partnership with Bradford College saw students create wearable 'fashion of the future' as part of their course... While Lates: Brains saw the black/blue (or is it silver?) dress go viral on social media.

**Above:** During the EuroScience Open Forum our Manchester museum explored the theme of 'Science in the City'



# CROSSING OCEANS MAKING FRIENDS

The Science Museum came late to the obvious rewards of touring its exhibitions abroad, but the group has arrived as a major contender for forging strong bonds with like-minded organisations across the globe. This year the touring exhibitions team celebrated an important milestone: 1 million people have visited our touring exhibitions since the programme started in 2014. This is largely thanks to the success of *Collider* – the London and Manchester 2013–14 exhibition exploring the work of CERN’s scientists and engineers – which 600,000 people have seen during its world tour.

Meanwhile, after a record-breaking run at the Science Museum, described by *The Times* as the ‘best space exhibition ever’ – *Cosmonauts: Birth of the Space Age* visited Moscow, where it was seen by 72,000 people and closed to rave reviews in January 2017.

Next year, the Museum of Science and Industry will send its exhibition *Wonder Materials: Graphene and Beyond* on tour. It is expected to go to Manchester’s twin city

Wuhan, where it will be the first Science Museum Group exhibition in mainland China. Meanwhile *Beyond the Lab* was created by the Science Museum in 2016 as part of an EU-supported initiative before starting its tour to every country in the EU.

The Science Museum kicked off the 2017 UK–Russia Year of Science and Education this January when we unveiled Tim Peake’s Soyuz TMA-19M to the world. Hot on its heels, *Valentina Tereshkova: First Woman in Space* opened in March, marking another flagship event. At a gala celebrating her 80th birthday Tereshkova opened the show herself as the ‘First Lady of Space’.

Group director Ian Blatchford visited Rio de Janeiro during the Olympic Games to seal our partnership with the spectacular Museum of Tomorrow. Our learning team helped to showcase London’s cultural scene by performing at the British House and have subsequently delivered professional training to their Brazilian counterparts. A curator from another of our partners, the National Science Museum in Daejeon, South Korea, is currently



‘International audiences have such an appetite for the same exhibitions that do so well in the UK. Collaborations overseas will be a cornerstone of the group’s reach’

Ian Blatchford, director, Science Museum Group



undertaking a one-year internship with the Science Museum Exhibitions team.

The learning team’s activity does not end there, and our excellent Punk Science comedy team have given performances in Norway. The outreach team visited every school in Gibraltar in November and at a panel discussion in Abu Dhabi our accessible programmes experts shared our experience of developing new audiences.

**Left:** The *Collider* exhibition’s world tour arrives at Queensland Museum in Australia; here Science Museum keeper Alison Boyle, innovation minister Leeanne Enoch, CEO of the Queensland Museum Network Suzanne Miller, and managing director of QGC Tony Nunan... Russian cosmonaut Valentina Tereshkova and Ian Blatchford opening *Valentina Tereshkova: First Woman in Space*

Last November the prime minister Theresa May announced the Science Museum’s forthcoming India season whilst on a trade mission. *Illuminating India* will form a key part of the UK–India Year of Culture 2017–18, and we have already secured a number of significant loans for these exhibitions. With all of this to show for 2016–17, the outlook for next year is already looking bright.

*Ian Blatchford’s overview of international strategy – page 4*

**Above:** The *Beyond the Lab* exhibition launches in London as part of the EU-supported initiative Sparks **Right:** Ian Blatchford making a promotional video for London & Partners at Rio’s Museum of Tomorrow





ACQUISITIONS

# WHAT WE ACQUIRED

In 2016–17 the Science Museum Group added 682 objects to its collection across its five museums. Here are ten representative acquisitions



**Barograph clock, 1766**  
By Alexander Cumming, case believed to be by Thomas Chippendale. Used by meteorologist Luke Howard for observations that were among the first urban climate studies. Acquired with assistance from the Art Fund and Wolfson Foundation.  
*Recipient: SM*



**da Vinci Classic surgical system, 1999–2001**  
Made by Intuitive Surgical, USA. In 2000, Lord Darzi carried out the first UK procedure using this robot-assisted system to remove a patient's gall bladder at St Mary's hospital, London.  
*Recipient: SM (see also page 34)*



**Coloured lithograph, 'Hertz's Radio Set 1886', by Eric Fraser, 1937**  
Used to promote General Post Office services. Fraser was one of Britain's leading commercial artists and worked for the *Radio Times* for many years.  
*Recipient: SM*



**Beagle 2 Mars lander ground test model, 2003**  
One of nine developmental models for the failed Beagle 2 lander, the first British spacecraft to touch down on the surface of Mars.  
*Recipient: SM*



**3D-printed 1:1 model of a human kidney, concept by Pankaj Chandak, 2015**  
This innovative 3D model was used by transplant surgeon Pankaj Chandak to rehearse the placing of a father's donated kidney in his two-year-old daughter.  
*Recipient: SM*



**Stamped cotton fabric samples, 1840–1920**  
Sent to Manchester merchant Rylands and Sons. These samples were produced for the north African market, reflecting Manchester's place at the heart of the global cotton trade.  
*Recipient: MSI*



**Manchester Steam Users' Association minute book, 1875–1882**  
Records of Britain's first boiler inspection authority, established in 1854 to help prevent steam boiler explosions that had previously killed and injured scores of people each year.  
*Recipient: MSI*



**Portrait of Timothy Hackworth, 1845**  
In watercolours on paper, by an unknown artist. Timothy Hackworth is one of the great early railway engineers, celebrated at our Shildon museum, Locomotion, and this portrait was acquired from his family.  
*Recipient: NRM*



**Ashtray, about 1915**  
Recovered from the wreckage of Britain's worst ever railway disaster at Quintinshill in 1915, in which 227 people were killed. Mounted in commemoration by Thomas Henry Barnfather Smith.  
*Recipient: NRM*



**Associated-Rediffusion in-vision clock, 1956**  
The original on-air clock that was shown before programmes by ITV franchise-holder Associated-Rediffusion from 1956 to 1964.  
*Recipient: NSMM*



**Orrery, c. 1740**  
*To: Yale Center for British Art, New Haven, USA*  
Made in London by Thomas Wright of Fleet Street. Lent for the exhibition *Enlightened Princesses: Caroline, Augusta, Charlotte and the Shaping of the Modern World*. Coming to Kensington Palace too.  
*Source: SM*



**Byzantine portable universal altitude sundial, 401–600**  
*To: Institute for the Study of the Ancient World, New York, USA*  
Fragments of a sophisticated sundial's geared calendrical device – the second-oldest surviving geared mechanism. Lent for the exhibition *Time and Cosmos in Greco-Roman Antiquity*.  
*Source: SM*



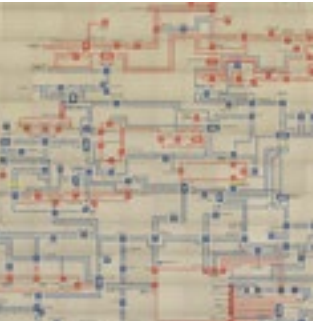
**Iron mask, worn by an executioner, 1500–1700**  
*To: Deutsches Hygiene-Museum, Dresden, Germany*  
By an unknown maker, with a grotesque nosepiece, moulded eyebrows and furrowed brow. Lent for the exhibition *Shame: 100 Reasons for Turning Red*.  
*Source: SM*



**Calotype, 1847**  
*To: Museo del Prado, Madrid, Spain*  
Photographed by Nicolaas Henneman, an image of 'Diego Velasquez: *The Family of Velasquez*, from an engraving by Kovatsch'. One of 85 items lent to *Copied by the Sun. The Talbotypes from 'The Annals of the Artists of Spain' by William Stirling Maxwell (1847)*.  
*Source: NSMM*



**D-700-KM picture receiver, 1960**  
*To: Jodrell Bank Discovery Centre, Macclesfield, UK*  
By Muirhead & Company. Used to receive the first photographs from the Moon taken by the Soviet probe Luna 9 in 1966. Lent to the exhibition *The Story of Jodrell Bank*.  
*Source: MSI*



**Mimic board, used 1983–1997**  
*To: Wellcome Collection, London, UK*  
From Becca Hall, a UK national grid regional control centre. One of 55 objects lent to the exhibition *Electricity: The Spark of Life*, produced in collaboration with the Museum of Science and Industry.  
*Source: MSI*



**Beattie Well Tank steam locomotive, 1874**  
*To: South Devon Railway Trust, Buckfastleigh, UK*  
One of our operational locomotive loans, London & South Western Railway locomotive No. 298 was built by Beyer, Peacock and Company.  
*Source: NRM*



**Wooden right below-knee leg, 1914–1918**  
*To: The Hunterian, University of Glasgow, Glasgow, UK*  
A temporary leg made for the veterans' hospital, Erskine House. Lent to the exhibition *Erskine 100. In War and Peace: The Erskine Story*.  
*Source: SM*



**Debie Sept 35 mm cine camera, 1921**  
*To: Tyneside Cinema, Newcastle upon Tyne, UK*  
Made in Paris by Établissements André Debie. This is one of five long-term loans to the Grade II listed venue in the heart of Newcastle.  
*Source: NSMM*



**Model steam locomotive, 1875**  
*To: Danish Railway Museum, Odense, Denmark*  
A model of the pioneering Stockton & Darlington Railway's *Locomotion* No 1 of 1825, one of two long-term loans.  
*Source: NRM*

LOANS

# WHAT WE LENT OUT

In the past year the group loaned 2571 objects to 174 different venues in the UK and 205 objects to another 23 overseas. Here's where ten ended up



# FINANCIAL OVERVIEW: DIVERSIFYING INCOME TO SUSTAIN GROWTH

By Jonathan Newby, deputy director and group chief operating officer



Runaway success: Jonathan Newby in the shop outside the hugely popular blockbuster *Robots* exhibition

## THE YEAR’S HIGHLIGHTS

**The Science Museum Group** attracted a total of 5,205,000 visits during the past year (–6%), among which 612,000 people visited in education groups (+1%).

**The Science Museum** attracted 3,219,000 visits (–6%) and welcomed 460,000 visitors in education groups, a new record.

**The National Railway Museum York and Locomotion, Shildon** attracted 936,000 visits (–3%), with the display of the *Flying Scotsman* resulting in the busiest ever April in York and the busiest month ever in Shildon. Visit totals included 46,000 coming in education groups (+5%).

**The Museum of Science and Industry** attracted 645,000 visits (–9%). Despite a drop in visit numbers, visits in education groups were maintained at 73,000.

**The National Science and Media Museum** attracted 405,000 visits (–12%), including 34,000 visits in education groups (+13%).

**A nationwide pattern:** Excepting performance at Shildon (+9%), visit numbers across the group have performed behind last year. At some sites this was anticipated to an extent, based on the scale or popularity of the planned public programme compared with previous years and onsite works

taking place. However, performance was further behind than expected (particularly in the first half of the year), similar to the experience of many national museums, particularly in London.

**Group digital audience:** There were 11,656,000 visits to the group’s websites. This was less than the previous year (–7%), mostly driven by taking down a significant quantity of legacy content as part of the project to relaunch each museum’s website in the year ahead.

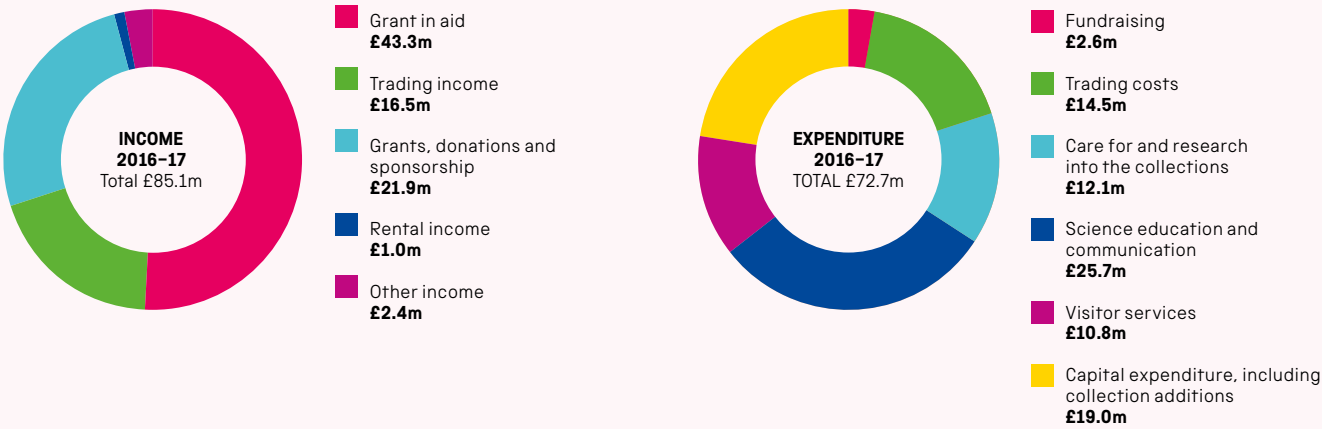
## SCIENCE MUSEUM GROUP VISIT NUMBERS 2016–17

Total number of visits to the museums	London	York	Manchester	Bradford	Shildon	Group
2015–16	3,419,000	750,000	707,000	460,000	213,000	5,549,000
2016–17	3,219,000	704,000	645,000	405,000	232,000	5,205,000

Visits in education groups	London	York	Manchester	Bradford	Shildon	Group
2015–16	458,000	37,000	73,000	30,000	7,000	605,000
2016–17	460,000	39,000	73,000	34,000	7,000	612,000

Information is sourced through both internal and periodic independent visitor surveys. Any anomalies in totals arise from roundings.

# SCIENCE MUSEUM GROUP FINANCIAL SUMMARY 2016–17



These charts are based on unaudited financial information extracted from management accounts at 31 March 2017.

With the opening of two state-of-the-art interactive galleries – *Wonderlab: The Statoil Gallery* at the Science Museum in London and the National Science and Media Museum’s own *Wonderlab* in Bradford – plus the launch of *Mathematics: The Winton Gallery* at the Science Museum, it has been a landmark year for the Science Museum Group. Those spectacular openings mark a step change for our permanent attractions, topped by our blockbuster *Robots* touring exhibition that was unveiled in London, and by our most significant acquisition in many years: Tim Peake’s Soyuz spacecraft.

All of this activity represents the culmination of prolonged hard work and none of it would have been possible without the dedication of our staff and the generous support of our visitors, sponsors and donors. This much-needed financial support has meant that in 2016–17 grant in aid represented only half of our total income – a demonstration of our continued drive to become financially more self-reliant through fundraising and diversification of income.

This financial year has been the first since 2010 in which our core government grant remained stable in cash terms (though still a cut in real terms). This very welcome commitment to our funding, together with a one-off increase in our capital grant this year, has encouraged essential investment in our infrastructure. We have upgraded our IT systems to improve resilience, cybersecurity and on-gallery Wi-Fi; we

have also invested in our online estate, with our new Science Museum Group Collection website offering unprecedented worldwide access. A new ticketing and customer relationship management system has helped us to understand more about what exactly visitors enjoy and the new *Wonderlab* annual pass adds another means of connecting with regular visitors.

However, there has been a drop in visitor numbers over the past year across the whole museum sector and our museums have been no exception. Though visitor numbers fell by a relatively small 6%, the impact on our commercial activities posed a challenge. Despite this, through rigorous cost control and a focus on driving spend per head, our commercial activities generated a contribution of £3.2 million to the group, which is in line with the previous year.

In this uncertain climate it is important that we manage risk by developing new sources of income, alongside a vibrant public programme to encourage repeat visits. For example, we introduced Steam Rides at the National Railway Museum in York which generated £51,000 in their first six months. At its Locomotion site annual attendances were up 9% and during the Shildon Shed Bash 8000 people spent £5 each to ride behind *Scotsman*, raising £40,000.

Venue hire saw a record-breaking year at both the National Railway Museum and Science Museum in London. After the success of last year’s *Cosmonauts*

exhibition range, the retail team developed exclusive products to celebrate *Robots*. These include posters, prints and a *Metropolis* film range resulting in £78,500 to date. The retail plan ensures that merchandise reflects each museum’s core pursuits, hence a product range in partnership with Zaha Hadid Architects, plus the dedicated *Wonderlab* retail space. Our museums’ shops in Manchester and Bradford introduced notable ranges including Peter Saville glassware and products bearing the new National Science and Media Museum branding.

Beyond our walls, the Science Museum Group has continued to broaden its international presence through its touring exhibition programme. In 2016–17 we saw the millionth person visit one of our touring exhibitions – a triumph for a programme that started in 2013.

At the heart of everything the group can achieve lies the care and preservation of our collections, and we were delighted to receive confirmation this year of government funding for the move out of a shared store in west London and into a centralised group store at our site in Wroughton. This presents a once-in-a-lifetime opportunity to digitise images and records while a huge number of objects are handled in the move. Technology then opens an unprecedented window on our collection and ensures that it is held in the best possible conditions for future generations.



# OUR GENEROUS SUPPORTERS

We extend our grateful thanks to all those individuals, families and organisations who chose to support the work of the Science Museum Group during 2016–17

SCIENCE MUSEUM

Individual philanthropists

Iain and Jane Bratchie  
The Helen Hamlyn Trust  
Dr Sara Levene  
Jim Mellon  
Alexandra Papadakis  
Miss Sam Rawle  
Dr Martin Schoernig  
All those who wish to remain anonymous

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All those who wish to remain anonymous

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At the *Winton Gallery* opening: All the funders of the Science Museum's new mathematics gallery, headed by David and Claudia Harding, with Mary Archer and Ian Blatchford

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special access to our museums, collections and programmes.

**Visitor giving** provides an opportunity for all our visitors to support our museums.

For further information

Please contact us on 020 7942 4041 or e-mail [development@sciencemuseum.ac.uk](mailto:development@sciencemuseum.ac.uk)



# WHO’S WHO IN OUR GREAT SCIENCE ALLIANCE

**THE SCIENCE MUSEUM GROUP COMPRISES:**

Science Museum, London  
National Railway Museum, York  
Museum of Science and Industry, Manchester  
National Science and Media Museum, Bradford  
Locomotion, Shildon  
SCMG Enterprises Ltd

**BOARD OF TRUSTEES OF THE SCIENCE MUSEUM GROUP**

The Board of Trustees of the Science Museum is responsible for the whole of the Science Museum Group. The trustees, who may number between 12 and 20, are appointed by and responsible to the prime minister through the Department for Culture, Media and Sport (DCMS). The director of the Science Museum Group, as chief executive officer, is responsible to the Board of Trustees; and, as accounting officer, is accountable to DCMS for compliance with the management agreement.

Within the framework of their statutory duties as stated under the National Heritage Act 1983, the role of the trustees is to establish group policy, review performance and endorse appointments to key management positions. Their primary activity is to assist the chairman in meeting the board’s overall responsibilities, in accordance with the policies of the secretary of state, and in compliance with charity law. The Board of Trustees also offers guidance and expertise on setting and implementing the strategy for the group.

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Mr Andy Savage  
Ms Vicky Stretch  
Mr Anton Valk CBE

*Serving during the financial year April 2016 to April 2017*

## NEW FELLOWS OF THE SCIENCE MUSEUM

**Timothy Peake:** in recognition of achievements of great distinction in his career, and in particular as astronaut on the Principia mission. His passion for engaging young people has inspired our visitors, and indeed the entire country.

**Helen Sharman:** in appreciation of her distinguished contribution to the advancement of human space exploration.

**Rt Hon. George Osborne MP:** in recognition of the tremendous support HM Treasury has given to the museum sector and in particular the Science Museum Group.

**Professor Dame Ann Dowling:** (pictured right, receiving her Fellowship from Mary Archer) in appreciation of her distinguished contribution to the advancement of science and engineering through research and advocacy.

**Professor Dame Nancy Rothwell:** in recognition of her distinguished contribution to public engagement with science, particularly in Greater Manchester, and for her advocacy for women in science, technology, engineering and mathematics.



# THE SCIENCE MUSEUM GROUP

The Science Museum Group is devoted to the history and contemporary practice of science, medicine, technology, industry and media throughout which the common bond is human ingenuity. For more than a century we have innovated and developed, becoming the world’s most significant museum group for science, technology and engineering, and attracting more than 5 million visits annually

**Heritage, mission and objectives**

Our collections form an enduring record of scientific, technological and medical change since the 18th century. The group incorporates the Science Museum, its Library and Archives; the National Railway Museum in York and Shildon; the Museum of Science and Industry in Manchester; and the National Science and Media Museum in Bradford. Our two major collections facilities are located at Wroughton in Wiltshire and Blythe House in west London.

The Science Museum Group as a non-departmental public body evolved in 2012 from its historic role as the National Museum of Science and Industry. We aspire to the highest international museum standards in the care and preservation of collections, scholarship, programming, learning and advocacy for our subject areas.

**Inspiring Futures**

In 2017 the Science Museum Group adapted its strategic approach and priorities for the period 2017–30.

**Vision** – A society that celebrates science, technology and engineering and their impact on our lives, now and in the future.

**Mission** – We inspire futures by:

- Creative exploration of science, technical innovation and industry, and how these made and still sustain modern society
- Building a scientifically literate society, using the history, present and future of science, technology, medicine, transport and media to grow ‘science capital’
- Inspiring the next generations of scientists, inventors and engineers

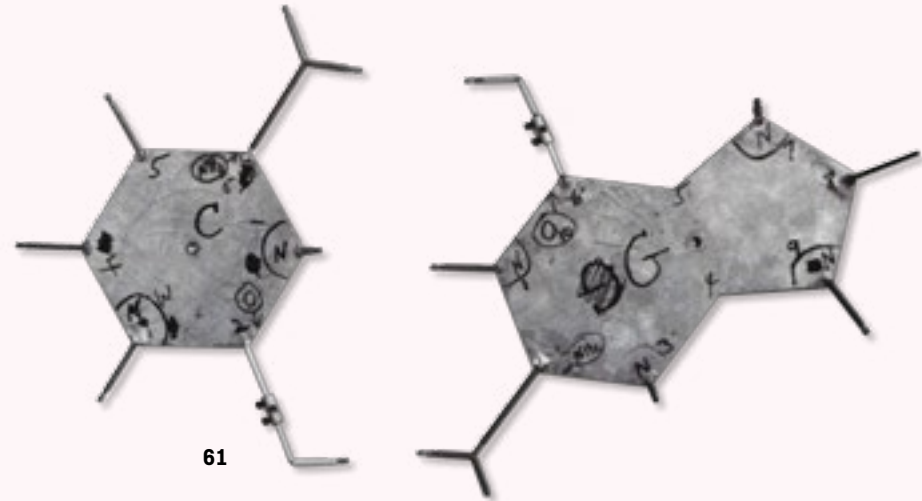
**Strategic priorities** – We will:

- Grow ‘science capital’ in individuals and society
- Grow our audiences and exceed their expectations
- Sustain and grow our world-class collection
- Extend our international reach
- Transform our estate
- Harness the potential of digital
- Increase income

**‘Where better to talk about how big data can make healthcare more proactive, preventative and predictive than in the Science Museum, next to Watson and Crick’s model of DNA’s double helix?’**

Dr Craig Venter, biotechnology entrepreneur, speaking at the annual dinner

**Below:** From the Science Museum Photographic Archive, metal plates used in Crick and Watson’s original double-helix model of DNA





# SCIENCE MUSEUM GROUP LONDON, YORK, MANCHESTER



## SCIENCE MUSEUM

Director: Ian Blatchford

Exhibition Road  
London SW7 2DD  
[sciencemuseum.org.uk](http://sciencemuseum.org.uk)

### Heritage

The Science Museum traces its origins from the Great Exhibition of 1851 when its world-class collection of original artefacts began amassing to represent the history of science, technology, engineering and medicine. Among the key exhibits on display in the museum are Arkwright's prototype spinning machine (1769), Stephenson's steam engine *Rocket* (1829), Cooke and Wheatstone's telegraph (1837), the Pilot ACE computer (1950) and the Apollo 10 capsule that went into lunar orbit in 1969. Our Library and Archives collection includes rare and significant items such as the first Latin translation of Ptolemy's *Almagest* and Charles Babbage's drawings for his calculating engines. The museum has pioneered interactive science interpretation for more than 80 years, while the *Tomorrow's World* and *Who Am I?* galleries are flagships for cutting-edge science. The museum attracts 3.3 million visits annually.

### Masterplan

Our Masterplan continues to transform the museum with recent new permanent galleries including *Information Age*, *Wonderlab: The Statoil Gallery* and *Mathematics: The Winton Gallery* (see *Inspiring Futures*, previous page).

## NATIONAL RAILWAY MUSEUM

Director: Paul Kirkman

Leeman Road  
York YO26 4XJ  
[nrm.org.uk](http://nrm.org.uk)

### Heritage

The National Railway Museum comprises a main museum in York set in historic buildings and a second museum in Shildon. Across both sites we care for the world's largest collection of 1 million railway artefacts, including locomotives such as *Flying Scotsman*, *Mallard*, *Duchess of Hamilton*, a working replica of Stephenson's *Rocket*, a Japanese bullet train, royal carriages displayed in our nostalgic Station Hall, uniforms, equipment, documents, photographs and many other significant railway items. The STEM agenda offers a learning programme of science shows and Future Engineers events.

### Masterplan

The £50 million Masterplan expects to deliver seven projects between 2021 and 2025, by developing nearby land to create an enhanced world-class museum. The Homes and Communities Agency has acquired the museum's surplus land in a significant step toward making York Central a new business and residential quarter as a 'cultural heart' for the city. In 2017 we are submitting major funding applications for redisplaying the Great Hall.

## MUSEUM OF SCIENCE AND INDUSTRY

Director: Sally MacDonald

Liverpool Road, Castlefield  
Manchester M3 4FP  
[msimanchester.org.uk](http://msimanchester.org.uk)

### Heritage

The Museum of Science and Industry occupies an important heritage site comprising five listed buildings. As the original terminus of the world's first inter-city railway, our authentic 1830 Warehouse epitomises Manchester's 19th-century reputation as 'the warehouse of the western world'. Key objects in the collection include models John Dalton used to demonstrate his atomic theory; parts from the world's first commercially available computer, the Ferranti Mark I; and a large collection of working steam mill engines. We demonstrate spinning and weaving daily on original machines in the *Textiles* gallery.

### Masterplan

A new special exhibitions gallery is planned. This ambitious project will provide a venue for world-class contemporary science exhibitions in the most significant part of our site – the 1830 complex. It will also enable us to continue our relationship with organisations such as the Wellcome Trust and Siemens UK, to help develop our reputation and the city's as a globally significant place for science innovation and understanding.

# SCIENCE MUSEUM GROUP BRADFORD, SHILDON, WROUGHTON



## NATIONAL SCIENCE AND MEDIA MUSEUM

Director: Jo Quinton-Tulloch

Pictureville  
Bradford BD1 1NQ  
[scienceandmediamuseum.org.uk](http://scienceandmediamuseum.org.uk)

### Heritage

The newly renamed National Science and Media Museum, in the heart of Bradford, explores the science and culture of image and sound technologies, and their impact on our lives. The museum's specialism draws on more than 3 million items of historic significance in its national collections of photography, cinematography and television. Pivotal world firsts include the Leeds-made camera used by Louis Augustin Le Prince in 1888 to make the earliest moving pictures in Britain, and Kodak No. 1, the American-made camera that enabled mass photography from 1889. Europe's first IMAX theatre opened here in the museum in 1983, and our Pictureville cinema boasts the only permanent, regularly programmed Cinerama installation in Europe.

### Masterplan

The *Sound and Vision* galleries – due to open in 2022 – will provide worthy companions to the recently opened *Wonderlab* interactive gallery. These new displays will showcase the most significant objects in the collection, covering key moments in history. A major exhibition on sports broadcasting is due in summer 2018.

## LOCOMOTION

Director: Paul Kirkman

Dale Road Industrial Estate  
Shildon DL4 2RE  
[nrm.org.uk/planavisit/visitsildon](http://nrm.org.uk/planavisit/visitsildon)

### Heritage

The National Railway Museum's sister site is Locomotion at Shildon, 'the cradle of the railways'. The museum is a partnership with Durham County Council and houses items from the national collection. A charismatic 19th-century area centred on the former home of Timothy Hackworth grew out of the world's first steam-hauled public railway in 1825. An exhibition hall and workshop opened in 2004 to house many vintage locomotives and rolling stock including *Sans Pareil*, 1829, and its replica built as a working loco in 1979 by apprentices at British Rail's Shildon workshop, plus the record-breaking gas-turbine-driven Advanced Passenger Train and uniforms, equipment, documents and photographs. Locomotion hosts a busy programme of family activities and regular guided tours.

### Masterplan

The National Railway Museum is in discussions with Durham County Council about the evolution of Locomotion. Outcomes include remedial repairs, a maintenance plan for historic structures and improved interpretation across the site.

## SCIENCE MUSEUM GROUP STORE

Wroughton SN4 9LT  
(Pre-booked research visitors only)

The Science Museum Group's store at Wroughton in Wiltshire, founded in 1979 on a 545-acre former airfield, is our large-object store. It houses a superb range of huge artefacts – such as the world's first hovercraft and an early robotic arm used in manufacturing – available for both exhibition and research, as well as the Science Museum's Library and Archives. Wroughton is becoming a national hub for collections access and storage. The solar park in the centre of the airfield puts four times as much electricity into the national grid as we use as a group, while providing a reliable income stream.

## BLYTHE HOUSE COLLECTIONS STORE

Olympia  
London W14 0QX  
(Pre-booked research visitors only)

Blythe House at Olympia in London is shared by the Science Museum, V&A and British Museum for small-object storage. Following government's allocation of £150 million for all three museums to relocate, we plan to move out about 320,000 objects to a new facility at Wroughton, uniting the group's collections and improving access.

**From left above:** Red mill engine in steam in London; Queen Victoria's carriage, 1935, at York; Joule's 1860 electric motor in Manchester; 1931 photograph of Baird's television van at Bradford; the Advanced Passenger Train housed at Shildon; Lockheed 749 Constellation airliner, 1947, at Wroughton



# TOO MANY STEAM TREATS IN A SINGLE DAY!



‘Hosting Flying Scotsman and its fellow locomotives in County Durham was a unique thrill’

Locomotion manager Gary Campbell

Never underestimate the pulling power of celebrity locomotives. People turned out in their tens of thousands to see five steam-age superstars last July when the Shildon Shed Bash brought the *Flying Scotsman* season to an exciting climax. A full programme of thrills at Locomotion, the National Railway Museum’s site in Shildon, was themed around rail enthusiasts’ ‘shed bash’ culture of the early 1960s when ‘opportunistic’ train-spotters might stumble across rare locomotives lined up together – the Gresley A4 *Union of South Africa*, Deltic *King’s Own Yorkshire Light Infantry*, *Green Arrow*, Q6 No. 63395 and of course the main attraction, *Flying Scotsman*.

The nine-day event saw 44,400 visitors get up close and personal with these icons, while 8000 fans will never forget riding behind *Flying Scotsman* for only a fiver! Every afternoon they could also ride behind *Union of South Africa* – a rare treat in modern times to enjoy a Gresley A3 and A4 in the same day.

These two giants of steam heritage provided the breathtaking spectacle of a lunchtime shunt to take *Union of South Africa* off the Locomotion events apron and bring *Flying Scotsman* onto it. Being up close to the sight, sound, smell, touch and inevitable taste of steam made for a shunting experience to savour. The final

weekend of the bash brought the rare double-header of *Flying Scotsman* and *Union of South Africa*. This was the first time in decades that a Gresley A3 and A4 had double-headed a passenger train. Only three previous instances are on record, and none included *Scotsman*.

Locomotion’s manager Gary Campbell commented: ‘Special mention has to be made of our experienced volunteers without whom this hugely successful event couldn’t have taken place.’

**Above:** An enthusiast’s nirvana... Locomotion’s annual Shed Bash at Shildon featured a spectacular lunchtime shunt as *Flying Scotsman* changed places on the apron with *Union of South Africa*



# FROM STICKY START TO WONDER MATERIAL



Manchester’s ground-breaking touring exhibition about graphene explores the past, present and future of a realm in two dimensions

Amid great fanfare and enthusiastic reviews, July 2016 saw the Museum of Science and Industry open its most ambitious exhibition to date. *Wonder Materials: Graphene and Beyond* is the first major museum display to describe the story of the world’s thinnest material, which comprises a single layer of carbon atoms. Combining fascinating objects, photographs, film and commissioned artworks, the exhibition celebrates the new age of 2D materials distinguished by their extraordinary composition and their thickness of one atom. The first items in the exhibition were lent or donated by the ‘godfathers of graphene’ Andre Geim and Konstantin Novoselov, the University of Manchester physicists who successfully isolated the two-dimensional material,

shared a Nobel Prize and won a knighthood each. Along with their scientific notebooks and medals is the famous roll of sticky tape that provided the deceptively simple route to peeling from the surface of graphite the ‘wonder material’ graphene, which is super lightweight, super conductive and super strong.

The complexity of explaining graphene science posed a challenge for curators and one solution was to commission artworks. The renowned author Lemn Sissay wrote a new piece for video, ‘The World Wakes’, and performed it live in front of hundreds of VIP guests at the exhibition launch. Also featured was an art installation by Random International, while the acclaimed composer Anna Meredith led a four-day

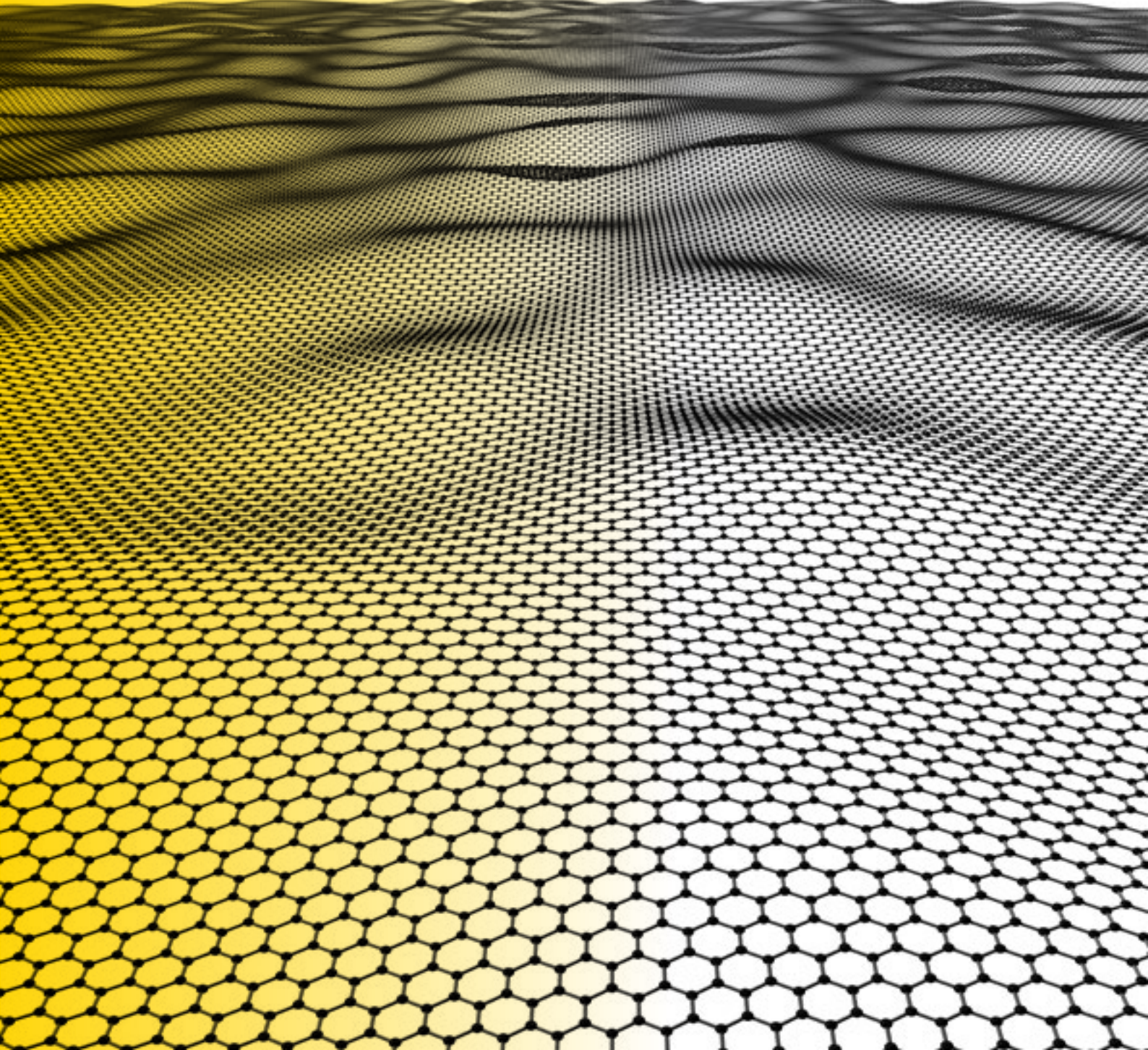
residency at the museum for young and emerging female musicians and artists to create new works.

Thanks to a global surge in graphene research, new exhibits were added to *Wonder Materials* in December, highlighting its potential effects in fields as diverse as healthcare and the environment. Some of these objects came from the exhibition’s headline sponsor, Haydale Limited, while others came from the exhibition partner, the National Graphene Institute at the University of Manchester.

**VIEW THIS**  
[tinyurl.com/mujwycb](http://tinyurl.com/mujwycb)

**Left:** A humble sticky-tape dispenser, dated 2002, proved to be the unlikely medium for cleaning graphene samples before microscopy  
**Below left:** The author Lemn Sissay entertains guests at the opening of the *Wonder Materials* exhibition  
**Below right:** Andre Geim discusses the miraculous properties of graphene with the group’s director of external affairs, Roger Highfield  
**This page:** Almost like chicken wire, a landscape of graphene, one atom deep

‘To find a new material may be important but to find a whole class of materials – this happens very rarely in the history of humankind’  
Professor Sir Andre Geim, Nobel Prize-winner





# HOW HADID MADE MATHEMATICS BEAUTIFUL

An enticing sculptural space at the Science Museum pays tribute to Zaha Hadid’s career as an architect

Combining awe-inspiring design by Zaha Hadid Architects and more than 100 remarkable artefacts from the Science Museum Group’s collection, *Mathematics: The Winton Gallery* opened at the Science Museum in December to public and critical acclaim. The £5 million donated by David and Claudia Harding – the largest individual donation ever made to the museum – ensured this challenging subject was brought to life as never before. By the financial year’s end our permanent new gallery had attracted half a million visits.

Curator David Rooney selected each artefact to explore how mathematicians, their tools and ideas have helped shape the modern world over the past four centuries. The gallery’s zones are themed around such issues as money, travel, trade, beauty, life and death. Dame Zaha was ideally placed to crystallise this thinking into physical form, having been brought up to regard mathematics as a way of life.

Following her untimely death in March 2016, the new gallery stands as a fitting tribute, having itself been defined by mathematics. The soaring, sculptural design derives from equations of airflow used in the aviation industry and is inspired by the experimental Handley Page ‘Gugnunc’ aircraft (1929) which hangs, as if suspended in flight, at the centre of the space.

*Mathematics: The Winton Gallery* was also generously supported by principal sponsor Samsung, major sponsor MathWorks and a number of other individuals. Its opening was attended by a suite of luminaries whose work has been influenced by this grand subject. These included writers Tom Stoppard and Kazuo Ishiguro (whose father’s storm surge prediction machine sits in the gallery), mathematicians Simon Singh and Marcus du Sautoy, film-maker Anthony Geffen, Gail Cardew of the Royal Institution and physicist Lucie Green.



Curator David Rooney, the Hardings, Mary Archer and Ian Blatchford



‘We hope the Winton gallery will inspire more children to study maths and find it less frightening and more enticing’

Lead funders David and Claudia Harding