

SCIENCE
MUSEUM
GROUP

BLAZING A TRAIL FOR OUR FUTURE

ANNUAL REVIEW 2015–16



A FRESH AGENDA FOR RAIL

PAGE 9

LEONARDO PULLS CROWDS

PAGE 22

SOVIET SECRETS REVEALED

PAGES 10–15

FUNDS BOOSTED FOR STEM

PAGES 26–33

UP A GEAR IN MANCHESTER

PAGE 18

UNIFYING OUR COLLECTIONS

PAGES 44–47

TIM FIRES UP FUTURE GALACTIC EXPLORERS

When 3000 schoolchildren counted down to launch Tim Peake's mission in the Science Museum last December the noise, observed the BBC's science editor on TV, was 'louder than a Soyuz at full throttle'. It was one of our biggest ever public events, attracting 11,000 visitors throughout the 12-hour day.

Former Apache helicopter pilot Tim Peake's mission had begun three years earlier when Science Museum Trustee David Willetts, then science minister, overturned the space policy that arose from what he called the misconceived British belief that human space flight 'is an expensive luxury'. This paved the way to a press conference in the museum in May 2013 when Peake was unveiled as the 'first official British astronaut' for the European Space Agency, selected from 8000 candidates, on 'a momentous day', as the prime minister put it.

Peake returned to the museum last November to announce the countdown. 'It's a huge privilege to sit here,' he said, adding that he hoped some of the children inspired by his Principia mission would be among the first people on Mars.

As Peake was subsequently launched from Baikonur in Kazakhstan, 3.8 million viewers looked on as BBC *Stargazing Live* was presented from the museum by Brian Cox and Dara Ó Briain (and later nominated for a BAFTA). In all, 11,000 people celebrated at the museum that day, including the director general of the BBC Tony Hall; science minister Jo Johnson; plus four cosmonauts and astronauts – Russia's Alexei Leonov, Britain's Helen Sharman, Denmark's Andreas Mogensen and Canada's Chris Hadfield.

Leonov, the first spacewalker, remarked on how many in the museum had been moved to cry with joy, just as the Soviet people were when Yuri Gagarin inaugurated human space flight in April 1961. And during his first press conference from space, Peake said: 'I saw the wonderful pictures from the Science Museum in London and thought that was incredible, absolutely spectacular and phenomenal support.'

VIEW THIS
blog.sciencemuseum.org.uk/science-museum-launches-britains-first-official-astronaut



Tim Peake is announced as ESA astronaut at the Science Museum, 2013



Dara Ó Briain, Brian Cox and Chris Hadfield host the Principia liftoff on live TV, 2015



Live from space, Tim gives a thumbs-up to our museum visitors



“I saw the wonderful pictures from the Science Museum in London and thought that was incredible, absolutely phenomenal support

TIM PEAKE SPEAKING LIVE IN SPACE

“ I’m thrilled we’re breaking records yet again in Manchester, Bradford, York and Shildon. In London the Science Museum recorded its highest recorded attendances in its history

IAN BLATCHFORD
DIRECTOR, SCIENCE MUSEUM GROUP

“ Museums can drive economic growth, as well as inspire and enrich lives, so it’s great to see the National Railway Museum is at the cultural heart of this exciting regeneration proposal in York

THE RT HON. JOHN WHITTINGDALE
SECRETARY OF STATE, DEPARTMENT FOR CULTURE, MEDIA AND SPORT

“ Building a brand new gallery for contemporary science in Manchester’s Museum of Science and Industry is a fantastic way of showing how much the city continues to contribute to science

SIR RICHARD LEESE
LEADER OF MANCHESTER CITY COUNCIL

“ By 2021 we will have invested £7.5 million in world-class galleries and bold events to ensure the National Media Museum remains Bradford’s leading cultural attraction

LORD GRADE
SMG TRUSTEE AND CHAIR, NATIONAL MEDIA MUSEUM ADVISORY BOARD

“ The Science Museum always fascinated me and I think that really helped me make my career and educational choices

TIM PEAKE
FIRST BRITISH ESA ASTRONAUT

Cover image – The Science Museum’s heroine on its poster for the blockbuster exhibition *Cosmonauts: Birth of the Space Age*. Modelled on Mother Russia depicted by the Soviet artist Irakli Toidze in his poster *In the Name of Peace* (1959), which was published soon after the Soviet Union had launched the first satellite, Sputnik, and the dog Laika into Earth orbit, triggering a competitive ‘space race’ between the USA and USSR. The original poster was on loan from The Memorial Museum of Cosmonautics

OUR FIVE WORLD-BEATING MUSEUMS

Science Museum, London (SM)
National Railway Museum, York (NRM)
Museum of Science and Industry, Manchester (MSI)
National Media Museum, Bradford (NMeM)
National Railway Museum, Shildon (NRM)

SUPPORT OUR MUSEUMS

Visit sciencemuseum.org.uk/donate or for corporate membership and patrons see page 57

SMG ANNUAL REVIEW 2015–16

© 2016 The Board of Trustees of the Science Museum

Edited by David Johnson
with generous input from staff at SMG
and its many bloggers

Designed by Steve Lancefield

Project managers, Sinead Carroll and Sasha Unsworth

Copy editor, Lawrence Ahlemeyer

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

With thanks for additional photographs by:
Tim Anderson, Charlotte Artliss, Kasim Asim, Ed Bartholomew, BBC Television, Peter Byrne (Press Association), K Campbell-Payne, Dan Clarkson, Craig Connor (North News and Pictures), Richard Doughty, Benjamin Ealovega, Chris Foster, Government Art Collection, Jennie Hills, Stephen Iles, David Johnson, Leo Johnson, Paul Kingston (North News), Christina Korp, Philippe Levy, Jason Lock, Barry Macdonald, Andreas Mogensen, Roscosmos, Duncan Soar, Paul Thompson, Wellcome Images, Virgin Trains East Coast, Kira Zumkley

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 CO₂ 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.



TO MARS
AND BEYOND!

Our critically acclaimed *Cosmonauts* exhibition, visited by 140,000 people, saw the spiritual and the actual collide in the final gallery. There, a ‘golden man’ rested in the neon-blue space adorned with the founding father of rocketry Konstantin Tsiolkovsky’s most famous quotation: ‘Earth is the cradle of humanity, but one cannot live in a cradle for ever.’

The Russians had sent this life-size, gold-painted, tissue-equivalent phantom mannequin to the far side of the Moon to test for radiation, and the Science Museum team spotted it lying forlornly on the floor of a Moscow polytechnic museum. Senior curator Doug Millard says: ‘I knelt down to read the label and I was absolutely astonished that we were looking at something that had flown in space.’ In our blue room the face of the mannequin, that of the first man in space, Yuri Gagarin, gazed upwards towards a red light – the ‘cosmist’ dream destination of Mars.

CONTENTS

11 Cosmonauts is both a record and an example of the importance of soft power and cultural relations in maintaining dialogue between peoples at times of heightened political tensions

ALEXANDRA SMIRNOVA CO-CURATOR ON COSMONAUTS

SMG ANNUAL REVIEW 2015–16

11 The increase in visitors to the Science Museum Group's museums shows the public has a real appetite for knowledge and innovation, which bodes well for culture and the economy

SIR VENKI RAMAKRISHNAN NOBELIST PRESIDENT OF THE ROYAL SOCIETY



10



16



18



20



26



38



44

HIGHLIGHTS

- 4 Joint welcome from SMG chair and director
A spectacular year for quality and impact
- 10 *Cosmonauts* blockbuster breaks records
- 16 York welcomes *Scotsman* back in steam
- 18 Moving up a gear in Manchester
- 20 Dramatic new improvements in Bradford
- 26 Special section on SMG Learning
Driving career aspirations in STEM
- 38 A sparkling venue for scholars to meet
- 44 Uniting the group's care for collections
- 52 Introducing the expert volunteer



48



50

ON OTHER PAGES

- 6 SMG is the place to be
- 8 Funds to rehouse Blythe House store
- 9 Thought leadership role for railways
- 22 Leonardo full of surprises
- 24 Growing loyalty among partners
- 34 Widescreen festival reveals secrets
- 35 Manchester's cutting-edge festival
- 36 A stream of digital initiatives
- 42 Breaking ground in photography
- 43 New broom peps up Shildon
- 48 Entrepreneurial treat for gamers
- 50 Science Museum celebrates greats
- 64 What we lent out

APPENDIX

- Our five museums in profile*
- 54 SMG financial summary and visit numbers
- 56 Our generous supporters and how to give
- 58 Who's who behind our family of museums
- 59 Science Museum (SM), London
- 60 National Railway Museum (NRM), York and Shildon
- 61 Museum of Science and Industry (MSI), Manchester
- 62 National Media Museum (NMeM), Bradford
- 63 Science Museum at Wroughton and Blythe House

Back cover *Flying Scotsman* reborn
Inside front Tim Peake's space adventure
Inside back How we acquire and why

The Science Museum Group is now a beacon of British culture. I hope the message is widely circulated and understood

SIR CRISPIN TICKELL DIPLOMAT, ENVIRONMENTALIST, ACADEMIC

BLASTOFF FOR BRAVURA, QUALITY AND FUN

SMG chairman Mary Archer and group director Ian Blatchford survey the dynamism across this alliance of national museums, which is reaching more people than ever and restoring science to the heart of culture

It has been a remarkable year for the Science Museum Group and this Review celebrates the exhibitions, gallery developments, acquisitions, education projects and research achievements that played their part in making it so. For us, the quality and strategic impact count as much as volume, and the past year saw us both break new ground *and* reach more people.

We tested new kinds of events, from pop-up interactive festivals at the Museum of Science and Industry in Manchester, to thought leadership debates at the National Railway Museum, and interactive festivals at the National Media Museum. Our museums in Manchester and York lie at the heart of civic developments, emphasising our crucial role in urban regeneration and the cultural life of great cities. The opening of the new Dana Research Centre and Library in London also provided tangible evidence of our commitment to excellence in scholarship.

The numbers were impressive too. Total visits across the group exceeded 5.5 million and more than 600,000 people came in educational groups. It was exciting to see the Science Museum reach the highest recorded attendance in its history, while the public responded to the greater science focus at the National Media Museum with an 11% increase in attendance.

Within these 12 months of intense activity we feel that three exceptional moments were both wonderful in their own right and stand out as broader metaphors for style and aspiration.

First we recall standing late one night in the Science Museum watching, with astonishment and anxiety, as Vostok 6, the capsule that made Valentina Tereshkova the first woman in space, was craned with exquisite care into the building. It was the happy realisation that after almost five years of the

toughest negotiations and research, the Science Museum really would be opening its ground-breaking *Cosmonauts* exhibition on the birth of the space age. It was a world-class collaboration with landmark objects that had never been seen outside Russia, and was greeted with critical acclaim and record audiences.

There can be little doubt that this kind of bold, internationally minded thinking was one of the compelling reasons why the government acknowledged the importance of national museums through a flat cash settlement in the 2015 Comprehensive Spending Review. We have long argued that sustaining public investment in our group achieves remarkable benefits by inspiring hundreds of thousands of young people and their families. We are doing our utmost too to raise the profile of British science and engineering, and place science at the heart of culture.

Opposite: Dame Mary Archer and Ian Blatchford in the *Ada Lovelace* exhibition, before Margaret Carpenter's 1836 portrait of Lord Byron's daughter who anticipated the computer age

Below this: The late Dame Zaha Hadid before her own concept for the *Mathematics* gallery which opens later this year at the Science Museum



The government went even further by announcing a £150 million investment in rehousing the collections of our group, as well as those of the British Museum and Victoria and Albert Museum. This means that we can move collections from Blythe House in London to a state-of-the-art home at Wroughton in Wiltshire. Both the stability of our revenue funding and this major capital grant were secured in the context of tough public spending choices.

The second defining moment was the pleasure of steaming out of King's Cross station on the inaugural run of the restored *Flying Scotsman*, with a mixture of relief and joy. The refurbishment of the world's most famous locomotive has been protracted and costly, but as we watched the thousands of people waving and cheering every mile from London to York, it was clear that this locomotive commands a special place in national affection. And we were delighted that the chancellor of the exchequer should have

chosen the National Railway Museum as the venue for the launch of the National Infrastructure Commission.

The third moment was the noisiest: being engulfed by 3000 schoolchildren, and a large broadcasting team from the BBC, to watch Tim Peake's launch on his Principia journey to the International Space Station. Our mission to inspire felt very powerful indeed when surrounded by boys and girls from the most diverse backgrounds, all counting down live on national television as the rocket engines fired up. We were joined that day by the first man to walk in space, cosmonaut Alexei Leonov. He made the touching remark that it was so wonderful to see all these young people so proud of their fellow countryman.

At the time of writing our buoyant mood was tempered by the untimely death of Dame Zaha Hadid. Her glorious design for our new *Mathematics* gallery,



which opens at the Science Museum in December, have blazed a trail for an imaginative approach to presenting maths as central to the rhythm of our lives. A maths graduate before she embarked on architecture, and a potent role model for many, Dame Zaha exuded restlessness, ambition, determination and fun. We hope that this Annual Review conveys something of that spirit too.

SMG IS THE PLACE TO BE

Our museums again prove to be magnets for distinguished guests, from China's first lady to England's chief medical officer, Jenson Button and Valery Gergiev



1



2



3



Above: Buzz Aldrin on his way to the Science Museum with Brian Cox and Roger Highfield, director of external affairs

I really enjoyed my conversation with Prof Brian Cox today at Science Museum. Hey – let's do it again some time!

THEREALBUZZ BUZZ ALDRIN, ASTRONAUT



4



5



6



7



8



9



10



11

- 1 China's deputy prime minister Madame Peng makes a state visit to the Museum of Science and Industry where director Sally MacDonald and Manchester's lord mayor Paul Murphy show her weaving in action in the *Textiles* gallery
- 2 Chancellor George Osborne and entrepreneur James Dyson meeting Imperial College undergraduates who will work in the Science Museum's former Post Office Building, now the Dyson School of Engineering
- 3 Formula 1 driver Jenson Button visits the Science Museum's *Flight* gallery to launch the Santander Cycles Summer of Cycling competition
- 4 Dame Anne Glover, former chief scientific adviser to the president of the European Commission, delivers the keynote speech at the Science Museum director's annual dinner in 2015
- 5 Musical VIPs visit the *Cosmonauts* exhibition (left to right): Alexandra Smirnova (curator), Ian Blatchford (director, SMG), Valery Gergiev (conductor and general director of St Petersburg's Mariinsky Theatre), Peter Charow (vice-president Russia, BPI), Caroline González-Pintado (CEO of the Mariinsky)
- 6 Chief medical officer for England Professor Dame Sally Davies joins a *Cravings* discussion with Roger Highfield, psychologist Charles Spence and chef Jozef Youssef
- 7 Pop culturalist Sir Christopher Frayling with special effects guru Douglas Trumbull who gave the keynote speech at the National Media Museum's Widescreen Weekend
- 8 As sponsors of the new *Mathematics* gallery, MathWorks stakeholders enjoy a behind-the-scenes tour of the Science Museum and meet curator David Rooney, third from right
- 9 In Professor Roger Kneebone's Time Travelling Operating Theatre, Alex Cope (left) and Laura Coates were among a dozen distinguished surgeons simulating operations at Science Museum education events
- 10 At the Science Museum's Kraszna-Krausz exhibition and Book Awards 2015 reception, philanthropist Michael G Wilson meets David Goldblatt (Fellowship award winner) and legendary newspaper editor Sir Harold Evans (Outstanding Contribution award winner)
- 11 Television traveller Michael Portillo enjoys *Flying Scotsman's* inaugural run from London to York in February
- 12 Paul Kirkman, NRM director, shows Rachael Maskell, MP for York Central, over his museum

FINDING A HOME FOR 320,000 OBJECTS



The chancellor's spending review last December not only signalled a flat cash settlement for the Science Museum Group but an additional major strategic investment that has far-reaching consequences – namely, a share of the £150 million earmarked for ourselves, the V&A and the British Museum to find alternatives to storing objects at Blythe House in west London.

As a storage facility it belongs in the last century and is in a state of poor repair.

SMG will benefit from £40 million which – with some additional fundraising – will put us in a strong position both to improve care for our world-class collections at Wroughton, the former airfield in Wiltshire, and to build a new model for storage that is appropriate, sustainable and accessible.

We know that only a portion of our collections will ever be displayed at any one time. But we can reach more people if our stored collections are better known and can be accessed in many different ways, including large-scale digitisation.

The timing could not be better. Jack Kirby from the Museum of Science and Industry was already leading a significant review into how we register and care for the collection – from a group perspective rather than as individual museums – which in any case demands modernisation of our storage facilities in Wroughton [see page 44]. And SMG digital director John Stack has recently completed a strategy for increasing online access to our collections for a global audience. The digitisation of key items among about 320,000 small objects moving from Blythe House will give a huge impetus to this task.

“The outcome will be of real benefit for the public, our collections and the group

KAREN LIVINGSTONE
DIRECTOR OF MASTERPLAN AND ESTATES

It is a credit to the case made by all our museums that at a time of widespread reductions in public funding we are embarking on serious investment in Wroughton in order to support our wider ambitions as the world's biggest group of science museums.

Above: PhD candidate Rachel Boon leads a behind-the-scenes tour of Blythe House for corporate members of the museum. On the table, Robert Hooke type compound microscope (17th century)

RAIL'S RENAISSANCE IN THE NORTHERN POWERHOUSE

The National Railway Museum cemented its place at the heart of the debate about what role rail can play in creating the government's Northern Powerhouse, a vision launched by the chancellor George Osborne at the Museum of Science and Industry in June 2015.

In a special Thought Leadership event in October, 50 invited guests from the rail industry and beyond joined a discussion which the host, BBC *Newsnight* anchor Evan Davis, described as 'an evening of many ideas vigorously debated'. The evening focused on how we can deliver modern connectivity in a region with largely 19th-century infrastructure

and no city big enough to counter the gravitational pull of London. Unless, that is, you start thinking about the stretch of northern cities from Lancashire into Yorkshire as a single entity – the Northern Powerhouse.

The expert panel brought together insights from close to home with international perspectives from the Netherlands and Germany, where there is a longer history of joining up regions without an obvious single central city. David Hoggarth, newly appointed director of Rail North, highlighted the vital importance of connectivity offered by potential new northern and trans-Pennine rail services.

The renaissance in modern rail was once again the focus as locomotive legends of British engineering in the museum's Great Hall provided a fitting backdrop to the chancellor's launch of the new National Infrastructure Commission also in October. One of its first priorities will be to oversee infrastructure improvements to connect northern cities.

Labour peer Lord Adonis, who will chair the new commission, said at another NRM event: 'Without big improvements to its transport and energy systems, Britain will grind to a halt. We will provide firm recommendations on major projects, strategic direction and investment.'

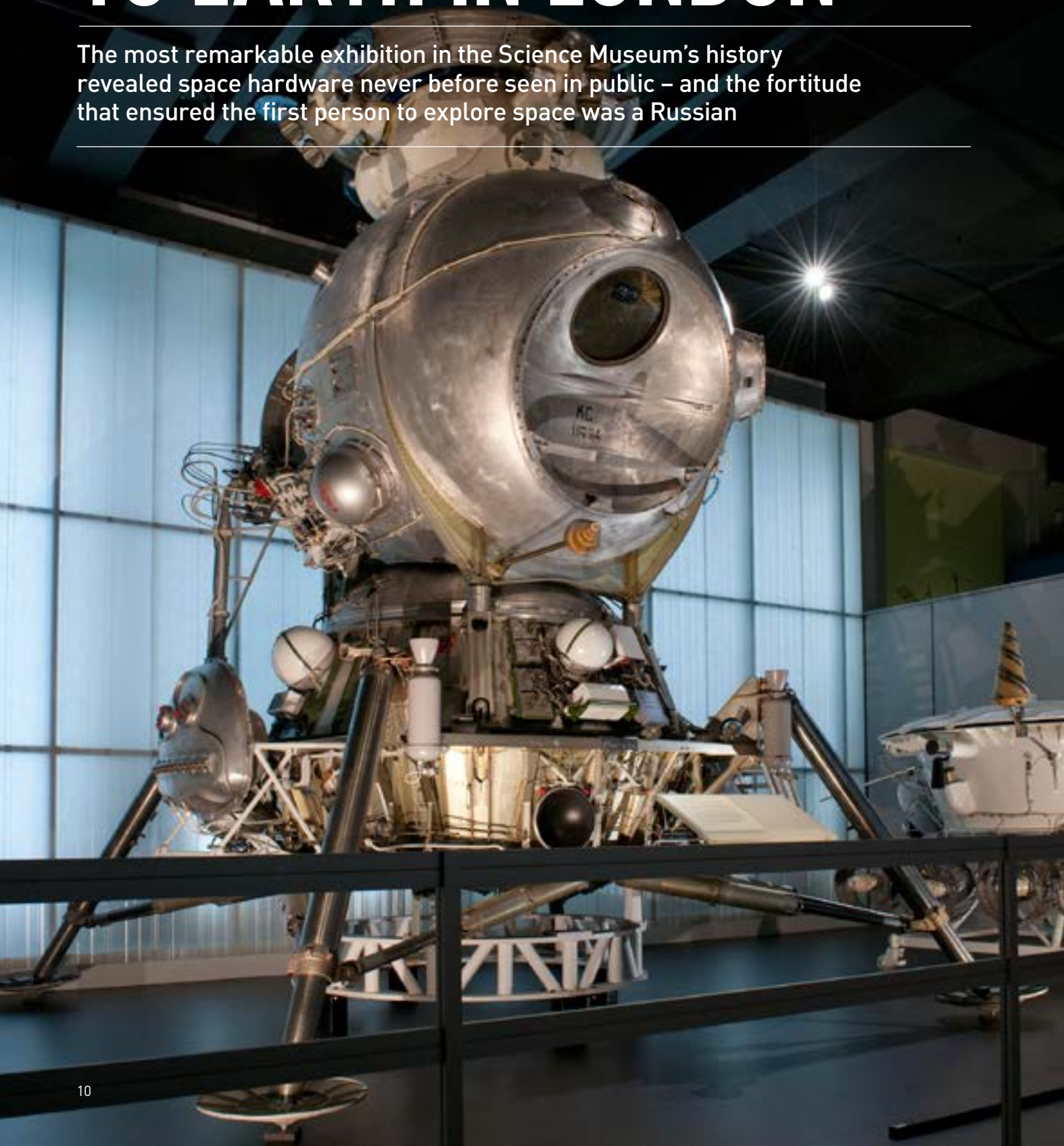
VIEW THIS
<http://tinyurl.com/jzb2fko>

Below: Speakers at the Thought Leadership event included Martin Husmann of Verkehrsverbund Rhein-Ruhr, Joost Ravoo of Netherlands Rail and David Hoggarth of Rail North, with Evan Davis in the chair



COSMONAUTS FALL TO EARTH IN LONDON

The most remarkable exhibition in the Science Museum's history revealed space hardware never before seen in public – and the fortitude that ensured the first person to explore space was a Russian



Four years in the making, *Cosmonauts: Birth of the Space Age* was quite simply a blockbuster like no other exhibition in the Science Museum's illustrious history. It quickly became a destination for pioneering cosmonauts and astronauts led by Valentina Tereshkova, Alexei Leonov and Buzz Aldrin. Their glowing reviews were matched by the responses from the diverse and knowledgeable audience of 140,000 who visited during the six-month run. The critics were won over too: 'colossal', said the *Telegraph*; 'triumph against all the odds', said the *Independent*; 'gripping', said the *Observer*; while *Nature* talked of being 'uplifted, transported, taken out of this world'.

A tour de force such as *Cosmonauts* can be achieved only through vision and determination, along with enormous support from an array of partners and an army of volunteers.

First came the foresight to assemble the most remarkable and monumental collection of Russian spacecraft and artefacts ever to be seen outside Russia since its Sputnik satellite triggered the space race in 1957. Then came the conviction to describe the dream of the

architect of the Soviet space programme, Sergei Korolev, and the astonishing influence of the cosmist movement and early innovators such as Konstantin Tsiolkovsky.

The Science Museum's team also had to overcome significant logistical challenges during the tortuous journey taken by the largest objects. The majestic LK3 lunar lander, for example, had to be dismantled then transported by road from Moscow to Helsinki, by sea to the UK and painstakingly manoeuvred through the museum and hoisted up to the first floor to be reassembled by rigging experts and Russian engineers.

SMG director Ian Blatchford, who was recently awarded the Pushkin medal, Russia's highest cultural honour for a foreign citizen, says that there is a wider message, one about the central role of museums in international diplomacy: 'The experience of working with Russia's cultural, industrial and political sectors has contributed not only to the loan of material of historic significance to the Science Museum's exhibition, but more broadly changes perceptions about Russia and its space programme in the

“I think you will leave the *Cosmonauts* exhibition with a different view of humanity's place in the cosmos

PROFESSOR BRIAN COX PHYSICIST, TV PRESENTER

western world. Addressing the multiple challenges involved – legal, political and security, among others – it reveals the importance of many of the space objects themselves as well as demonstrating how the Science Museum has helped to maintain a dialogue with Russia even during the most testing times.'

VIEW THIS
[blog.sciencemuseum.org.uk/
from-moscow-to-the-museum](http://blog.sciencemuseum.org.uk/from-moscow-to-the-museum)

Opposite: The LK3 lunar lander, one of the showpieces of *Cosmonauts*

This page: Conservator Emily Yates preparing a Sputnik for display... Vostok 6 arrives at the Science Museum... Model of the 1958 Sputnik-3 satellite, which some say inspired the television Daleks

AN EPIC INTERNATIONAL COLLABORATION



It took years of shuttle diplomacy by SMG director Ian Blatchford and the Science Museum team, under the expert guidance of senior curator Doug Millard, to identify and secure the remarkable spacecraft, equipment and artefacts for the *Cosmonauts* exhibition. The LK3 lunar lander, an official secret in Russia, even had to be declassified.

Blatchford and Russian curator Natalia Sidlina explained in the *Science Museum Group Journal*: 'The curators had to venture well beyond the museum sector and private collections. The content team found itself in uncharted territory in its search for original space equipment. The sealed doors of laboratories at technical universities, studios of forgotten artists and warehouses of classified enterprises had to open to enable them to identify and negotiate prospective loans.'

The enterprise demanded strong collaboration between the Science Museum, the State Museum Exhibition Centre ROSIZO and the Federal Space Agency in Russia, Roscosmos, embracing 24 crucial partners and 18 different lenders.

The leadership of deputy prime minister Olga Golodets proved essential, as was the assistance of Russian ambassador in the UK Alexander Yakovenko and his colleague Mikhail Shvydkoy, special envoy of the president of the Russian Federation for international cultural cooperation with the ministry of foreign affairs.



This page: Valentina Tereshkova opens *Cosmonauts* – left to right, Russian ambassador Alexander Yakovenko, Ian Blatchford, Dame Mary Archer, Russian deputy PM Olga Golodets, UK ambassador to the Russian Federation Sir Tim Barrow and BP chief executive Bob Dudley... Russian ambassador celebrates *Cosmonauts* at an embassy reception

I believe these stories will inspire a new generation to take steps towards the further development of humanity

OLGA GOLODETS DEPUTY PRIME MINISTER OF THE RUSSIAN FEDERATION



Significant and thoughtful support

Key organisations provided funding for *Cosmonauts*, including BP, Art Russe and the Blavatnik Family Foundation. From the outset, BP, the exhibition's principal sponsor, was wholly encouraging and demonstrated its ongoing belief in the importance of increasing public engagement with science and technology. To underline the exhibition's significance, it was sponsored by *The Times* newspaper



We've been struck by the number of Russians who've been coming, including many who have made the journey from Russia

DOUG MILLARD SENIOR CURATOR OF COSMONAUTS



and celebrated with a series of events, including a concert by Public Service Broadcasting, interview with Oscar winner Alfonso Cuarón, space comedy with Robin Ince, Q&A between Buzz Aldrin and Brian Cox, and a Royal Society public event featuring Helen Sharman and Lord Rees.

In a dedicated *Cosmonauts* shop, the most successful range of exhibition

merchandise the museum has ever produced generated three times as much profit as forecast.

Mystical undertow

Key exhibits on show in London had never been seen by Russian citizens and some had been declassified so that they could travel. Many more revealed the extraordinary roots of space exploration in 19th-century Russia. Senior curator Doug Millard said: 'We wanted this exhibition to be more than a parade of technology, a far broader cultural treatment. For example, many Russians saw space in terms of philosopher Nikolai Fedorov's mystical idea of "cosmism", which envisaged man's resurrection and ancestral revival through the medium of space.'

Clockwise: Michael Bird, director of British Council Russia, Ian Blatchford and Russian ministers Dmitry Livanov and Veniamin Kaganov... Cosmonaut Alexei Leonov generously promoted the exhibition, here interviewed by Ian Blatchford... Sergei Krikalev with senior curator Doug Millard... Ian Blatchford receives the Pushkin medal from president Vladimir Putin... Dame Mary Archer shows VIP guests a Soyuz capsule

OUR GALAXY OF COSMONAUTS



Over the past year our IMAX auditorium was the place to be for space fans of all ages, and tickets sold out in record time to hear from an extraordinary array of distinguished space pioneers including Alexei Leonov, Valentina Tereshkova, Buzz Aldrin, Chris Hadfield, Aleksandr Lazutkin, Helen Sharman, Sergei Krikalev and Claudie Haigneré.

Cosmonaut Leonov, twice Hero of the Soviet Union and the first man to walk in space, joined us to announce the forthcoming *Cosmonauts* exhibition to the UK press, and then, with the help of chalk and blackboard, gave a vivid personal account of his first spacewalk to a spellbound audience. Afterwards, Stephen Hawking and the chairman of the board of trustees, Dame Mary Archer, presented Leonov with an honorary fellowship of the Science Museum. In return, Leonov presented Professor Hawking with a portrait he had sketched of him that day.

Our distinguished guest of honour at the exhibition's opening was Valentina Tereshkova, the first woman in space,



the first civilian and still the only woman ever to have flown a solo mission. At the official press preview the charismatic Dr Tereshkova wowed the gathered press with her humour and stories from her historic mission. She also asked to be launched into space with the director, Ian Blatchford, and was reunited with Vostok 6, the actual 2.6-tonne spacecraft that carried her into and back from orbit in 1963. She called it: 'My lovely one, my best and most beautiful friend, my best and most beautiful man.'

This exhibition has got to be a blockbuster, this is going to be a once-in-a-lifetime experience

HELEN SHARMAN BRITISH COSMONAUT
SPEAKING AT THE EXHIBITION OPENING

Clockwise: Alexei Leonov presents Stephen Hawking with a portrait he had drawn... Valentina Tereshkova during her talk to the IMAX audience... Buzz Aldrin demonstrates gravity at the Science Museum



Volunteers surprise with expertise

A volunteer team of 114 people gave their support to the *Cosmonauts* exhibition, contributing 5833 hours of their time as guides roving the gallery. Some were retired professionals within relevant disciplines such as physics, medicine or teaching, who often spontaneously addressed a circle of visitors. Some compiled research during the exhibition – a copy of which we have sent to our partners in Moscow. One volunteer, Stephen, reported: 'It seems that each

If you and I went into space together, this would be the best proof of British–Russian cooperation

VALENTINA TERESHKOVA TO SMG DIRECTOR IAN BLATCHFORD



visitor to the exhibition has a special personal reason for being there. Russians of a certain age have a tear in their eye as they contemplate their past. This is an experience I shall never forget.'

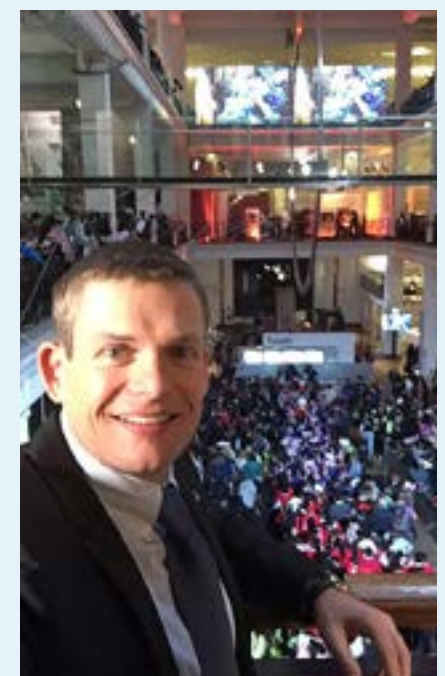
Our visitors were equally impressed: 'The volunteers are so knowledgeable and helpful' (Elaine King)... 'A wonderful volunteer called Sheila brought the exhibition alive for our children. She was patient and informative and truly inspired our 7-year-old son' (visitor via feedback form)... 'The volunteers were amazing – passionate and able to convey their knowledge to a wide range of audiences' (via feedback form). One of those who rang to express their delight with the volunteers was Andy Green, world land speed record-holder.

An experiment for volunteers – page 52

Clockwise: Sergei Krikalev at the *Cosmonauts* press launch... Tim Peake eagerly helped promote the exhibition... Likewise, NASA administrator Charlie Bolden gave a lecture, Danish astronaut Andreas Mogensen tweeted a selfie and British astronaut Helen Sharman met legions of young space enthusiasts

The who's who of space explorers drawn to our Cosmonauts exhibition

Buzz Aldrin
Charlie Bolden
Chris Hadfield
Claudie Haigneré
Don Johnson
Sergei Krikalev
Aleksandr Lazutkin
Alexei Leonov
Andreas Mogensen
Tim Peake
Helen Sharman
Valentina Tereshkova





40 YEARS AS ONE OF YORK'S STAR ATTRACTIONS

The National Railway Museum celebrates a milestone in our heritage and unveils bold new plans

The nation has delighted in the return to steam of *Flying Scotsman*, but National Railway Museum director Paul Kirkman is equally proud of the museum's other achievements over the past year as it celebrated its 40th birthday. 'While *Scotsman* is undeniably special, the teams here in York and in Shildon have grown our audiences in many wonderfully diverse ways in 2015,' he says.

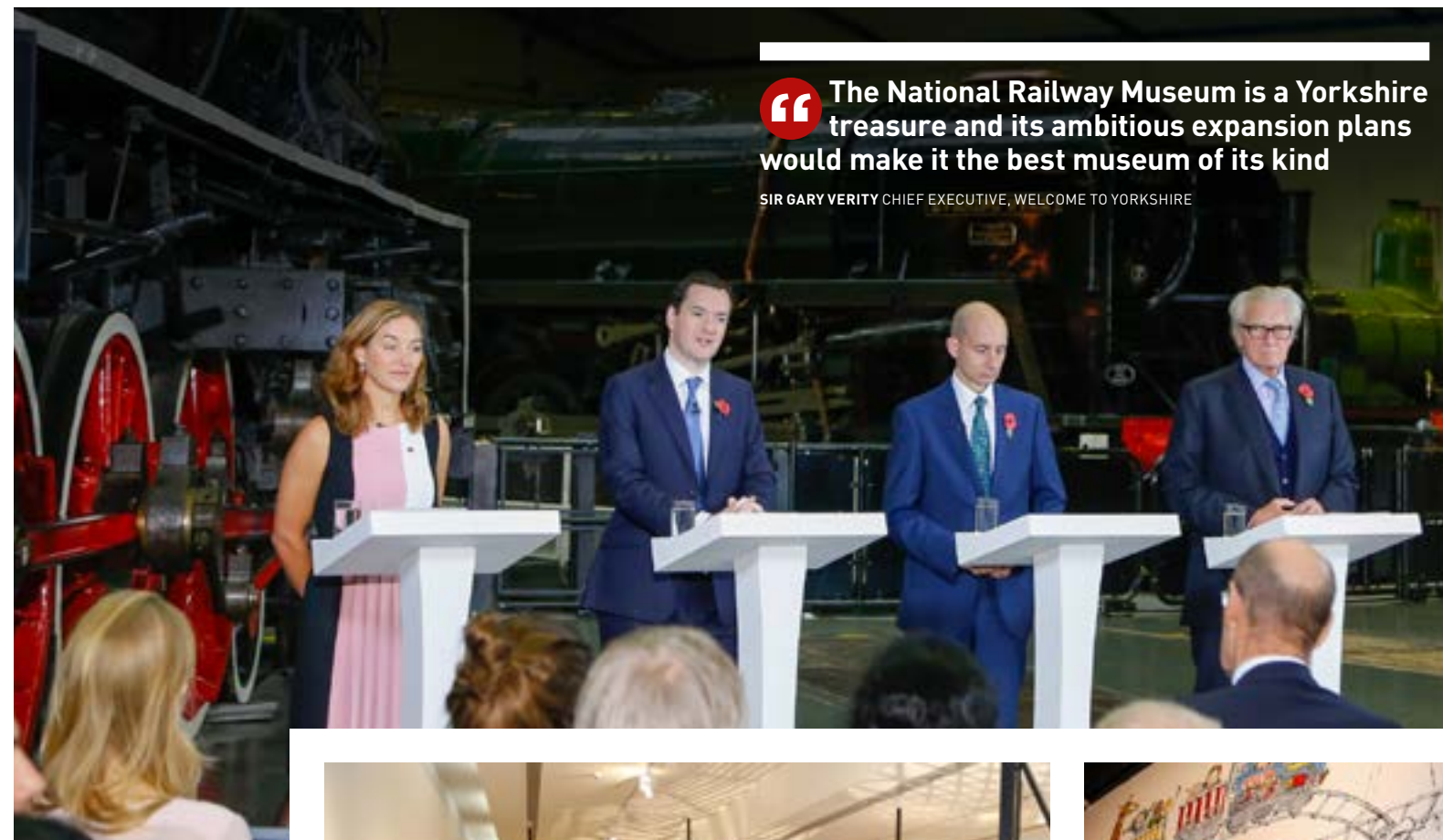
The award-winning collaboration between the museum and York Theatre Royal breathed life into railway stories for new audiences, from the iconic childhood favourite *The Railway Children* to the forgotten rags-to-riches story of York's 'Railway King' in *In Fog and Falling Snow*. The versatility of the museum's art gallery helped boost this year's temporary exhibitions. For *Playing Trains* it became a play space where children explored railways big and small. With *Destination Stations*, dramatic lighting and design captured the impact of Britain's most recognisable rail landmarks.

Destination Stations juxtaposed striking images and artefacts from the museum's world-class collection with rarely seen



treasures from key lenders to track the architectural development of Britain's railway stations over time. Highlights included never-before-exhibited architectural plans such as London Bridge, Euston and Glasgow Central from Network Rail's archives, alongside a stunning model of the award-winning redesigned London King's Cross from architects John McAslan + Partners, and fascinating plans of Waterloo (Grimshaw Architects) and Newcastle Central (Ryder Architecture).

In July the York museum opened its improved Miniature Railway Ride. Bigger and better than before, the new ride takes visitors past railway objects in the re-landscaped South Yard. Our eager volunteers have had a huge role in its success, giving rides to 50,000 people since it reopened. In October the Great Hall was plunged into darkness as its famous engines took centre stage, transformed by lighting for Locos in a Different Light as part of the annual Illuminating York festival. In the same



The National Railway Museum is a Yorkshire treasure and its ambitious expansion plans would make it the best museum of its kind

SIR GARY VERITY CHIEF EXECUTIVE, WELCOME TO YORKSHIRE



month one of Eurostar's iconic first-generation trains was also unveiled, along with a display celebrating a new chapter of contemporary railway history.

To celebrate its 40th birthday, the museum joined forces with Virgin Trains East Coast. Before an audience of supporters at York station, managing director David Horne and Paul Kirkman recognised 40 years of Britain's national railway history showcased in the North by unveiling a newly named locomotive, No. 43238 *National Railway Museum* 40

Clockwise: Virgin Trains East Coast managing director David Horne and NRM director Paul Kirkman unveil the new name for locomotive 43238... George Osborne visiting NRM to launch the National Infrastructure Commission... Ian Giles as George Stephenson in *In Fog and Falling Snow*... *Playing Trains* features work by illustrator Sam Usher... *Destination Stations* exhibition... The NRM's annual dinner in Station Hall

Beneath: Vintage still from York's Aesthetica Short Films Festival



Years 1975–2015. David Horne said: 'It seemed only fitting that we dedicate one of our locomotives to mark four decades of this amazing national institution.'

Looking to the future, the potential transformation of York's biggest brownfield site offers the greatest opportunity for the museum since that 1975 opening. The area, known as York Central and already dubbed the future 'King's Cross of the North', was awarded Enterprise Zone status in the chancellor's autumn statement and plans for its redevelopment were put to a public consultation in January 2016. Kirkman says: 'York Central is the most important thing to happen to the museum yet. It has the potential to deliver a new city centre and a transformed National Railway Museum would be its cultural heart.'

Shildon's highlights – page 43

VIEW THIS
blog.nrm.org.uk/gresley-overhaul-2



MANCHESTER GROWS IN INTERNATIONAL INFLUENCE

'This is the year we moved up a gear in Manchester,' said SMG chairman Dame Mary Archer, 'with the Museum of Science and Industry reasserting itself as an internationally significant museum with a serious purpose. Given the scale of our ambition, visitors can expect to see fresh fruits of the team's work over many years.'

As director Sally MacDonald enters her second year at the helm, she is pleased to note that annual visit numbers exceeded 700,000, boosted by increases in both general visits and school bookings. But her sights are set on the future: 'As an integral part of making Manchester a great European City of Science, the next 12 months offer more opportunities to expand our impact across the region while developing our first major home-grown temporary exhibition, about graphene, and pushing ahead with the Masterplan.'

The past 12 months have plenty to commend them. The growing band of visitors has responded well to MSI's new visual identity featuring a steel hexagon, which references both historic engineering and the structure of



The MSI has long championed the creativity of science, consistently putting on events that inspire

SIMON CHAPLIN DIRECTOR OF CULTURE & SOCIETY, WELLCOME TRUST

graphene to encapsulate the museum's heritage and contemporary purpose.

Highlights have included the museum's exhibition, *The Innovation Race: Manchester's Makers Join the World*. The museum won the Lever Prize – awarded by the North West Business Leadership Team – for a collaboration with Liverpool's FACT (Foundation for Art and Creative Technology), exploring the interaction between art and science; and also triumphed at the *Manchester Evening News's* City Life Awards, winning the Best Event category for the Manchester Science Festival's adult ball pool.

Behind the scenes, the first major element of the museum's Masterplan – a new special exhibition gallery – is now almost fully funded, thanks to significant investment of £1.8 million from the Wellcome Trust. The investment was welcomed by the leader of Manchester City Council, Sir Richard Leese, as 'a coup for both the museum and the city'. He added: 'Building a new gallery for contemporary science in the vaults of one of the most important and historic buildings in Manchester is such a fantastic way of showing how much



the city has contributed, and continues to contribute, to science nationally and globally. This new gallery will further enhance our reputation for putting science at the heart of our cultural life.'

The museum has appointed award-winning architects Carmody Groarke to design this landmark exhibition space, which will open in late 2018.

So with big plans and a growing audience, the future is looking bright for a museum firmly rooted at the heart of the Northern Powerhouse.

Manchester Science Festival – page 35

VIEW THIS
msimanchester.org.uk/collection

Opposite: Lates evenings for adults on themes of Graphene (top) and Cravings with visitors game for indulgence (beneath)

This page: Recording Radio 4's *The Infinite Monkey Cage* at MSI, Brian Cox and guest Jon Culshaw... Geoffrey Piper of NWBLT and Jo Wright of FACT present MSI director Sally MacDonald with the Lever Prize for exploring the interaction between arts and science





Clockwise: Liz West beneath her installation *An Additive Mix* during the *Light Fantastic* exhibition... DJing for the Make Some Noise festival... A young visitor learns how to make a UV torch... Artists in residence Noise Orchestra creating soundscapes... Museum director Jo Quinton-Tulloch at the opening of *Drawn By Light*



“Watching the political censorship of culture in many parts of the world, I’m convinced of the vital importance of museums like the National Media Museum which cherish our heritage

SAMIRA AHMED
NMEM ADVISORY BOARD MEMBER AND BROADCASTER

FESTIVALS BRING NEW AUDIENCES TO BRADFORD

Emphasis on light and sound attracts all the family

The past 12 months have seen the National Media Museum in Bradford make a deft but decisive step towards fulfilling its promise to begin using its collections and programme to create an inspiring home for the culture of science and technology. Three contemporary science festivals – themed around light, forensics and sound – have brought new family audiences into the museum, while playing host to the British Science Festival Fringe has put the museum in the shop window for serious science. Professor Jim Al-Khalili’s lecture on the

surprising history of optics could not have had a more appropriate setting than the home of the world’s greatest treasury of still and moving image technologies.

The £1 million investment from Bradford Council is also helping the museum to dramatically improve the way it serves schools in the region, enabling it to react to their individual needs and combat long-term shortfalls in the number of students who go on to pursue careers in science, technology, engineering and maths (STEM).



Every area in the public programme has been electrified by the new focus: the summer exhibition, *Light Fantastic – Adventures in the Science of Light*, housed a striking new art installation that literally illuminated the scientific principles that underpin the formulation of white light. It also brought record audiences to the museum.

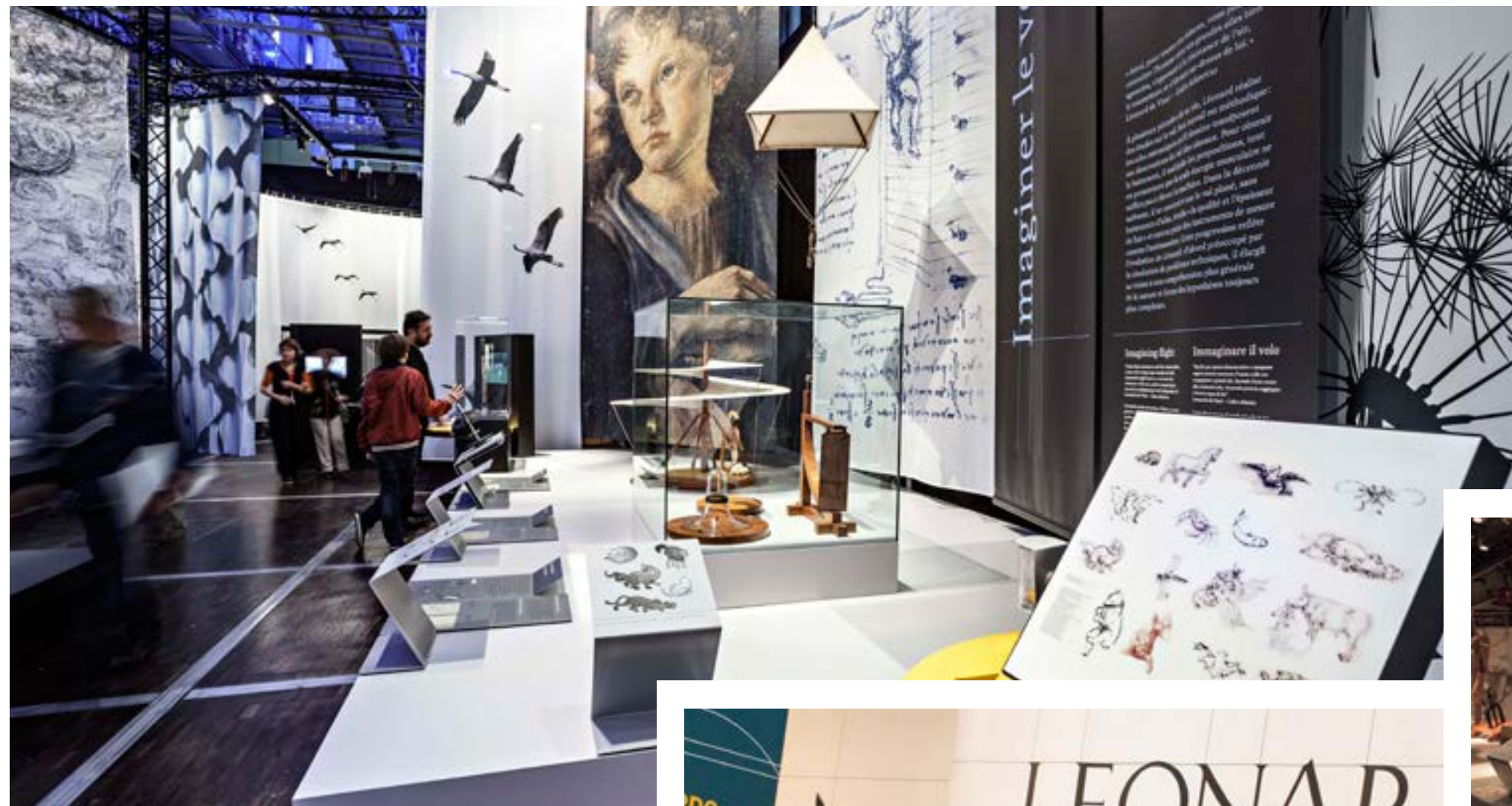
Widescreen Weekend – the festival of cinema technology – pushed its own barriers to bring two science-fiction pioneers to Bradford. Douglas Trumbull, who created the visual effects for *2001*, laid out his revolutionary vision for the future of cinema [see page 34], and Paul Franklin gave a masterclass in the real science behind the Oscar-winning special effects he created for *Interstellar*. In total we attracted 460,000 visits this year – an annual increase of 11%. In part this resulted from the

vastly improved IMAX cinema which is winning a younger audience and helping to drive income.

The planned investment of £7.5 million in the National Media Museum by 2021 is already improving its overall fabric, from the IMAX upgrade to the new £1.5 million interactive gallery, due to open in March 2017, which will explore the science of light, sound and perception. The new *Treasures* galleries will tell the complete history of the ‘age of the image’, cementing our new mission to explore the science and culture of light and sound technologies and their impact on our lives.

IMAX auditorium receives overhaul – page 48

VIEW THIS
nationalmediamuseum.org.uk/collection/onthistday



LEONARDO AS CROWD-PLEASING GENIUS

Leonardo da Vinci: The Mechanics of Genius opened in February to great fanfare. 'Spectacular,' remarked the *Guardian*, while the *Daily Telegraph* noted that this 'ambitious interactive exhibition' viewed the 'great polymath from a scientific ... perspective' and predicted that it would be one of the most popular exhibitions of 2016.

The world's leading Leonardo scholar Professor Martin Kemp lit up the launch event with a compelling speech, saying that despite the many legends that surround the genius who created *Mona Lisa* and *Vitruvian Man*, 'the reality

beneath the stories is no less exciting, as the Science Museum's new exhibition makes abundantly clear'.

The exhibition explores how the ultimate Renaissance figure created hundreds of drawings to understand scientific and engineering concepts across a variety of disciplines. Kemp said they were 'thrilling' and showed how, more than his contemporaries, Leonardo was capable of 'mental sculpture' to visualise complex mechanisms and motions.

Generating ideas for machines of war, flight and manufacturing, Leonardo



“Leonardo visualised machines with a brilliance that no-one else had ever done, and drew them with a presence and potency that no-one else had ever done

PROFESSOR MARTIN KEMP ART HISTORIAN

observed natural phenomena and the work of architect-engineers around him to make advances and efficiencies in mechanical processes. It was this unique approach to observation and understanding through drawing that sets him apart from his contemporaries.

Originally produced as a collaboration between Cité des Sciences in Paris, a Unverscience site, and the Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci in Milan, the internationally acclaimed exhibition made its UK debut in London.

Here, the Science Museum shared its own historical link to Leonardo. Curated by keeper emeritus Jim Bennett, a small display opened the larger exhibition with three models from the Science Museum's collection (including the amusingly named 'boring machine').

The models date from a 1952 exhibition at the Royal Academy, originated by a Science Museum associate curator to celebrate the quincentenary of Leonardo's birth.

Leonardo was inspired by nature and to be as interested in bat wings as cogs was a radical departure in his day. The exhibition, supported by Airbus, also looks at what today is called biomimicry in modern robotics and aeronautics, such as the winglets of an Airbus A380 being inspired by the upward curl of an eagle's feathers.

VIEW TRAILER
<https://youtu.be/Kca2QhvL5aU>

Clockwise: The Mechanics of Genius features 3D models based on Leonardo's concepts... Curator Jim Bennett... Leading Leonardo scholar Professor Martin Kemp... Introducing Leonardo to Science Museum visitors

GROWING SUPPORT FROM DIVERSE FUNDING PARTNERS

Loyalty is crucial to investing in SMG's future



'Shared goals and museum plans that inspire.' These two factors, says SMG development director Sue Fisher, lie at the heart of all of the funding partnerships that make possible 'the extraordinary ambition that reverberates through our plans for all the museums in the group'. We are fortunate to enjoy the long-term support of many partners, such as BP, the engine behind our Enterprising Science programme. But even with established partners, a spark around a particular exhibition or programme can further deepen our relationship. And so it proved again this year. 'Cosmonauts tells the story of the Russian space programme as never before,' remarked Bob Dudley, group chief executive of BP, whose support was fundamental to the exhibition's success.

A host of significant new partners have joined SMG this year. In Manchester, Haydale Limited is enabling us to explore one of the most remarkable scientific

developments in *Wonder Materials: Graphene and Beyond*. MSI has plans for many more temporary exhibitions as work begins on its new special exhibition gallery supported by the Wellcome Trust.

In York, the joint commitment of rolling-stock companies Angel Trains, Porterbrook and Eversholt is key to NRM's new Young Engineers programme. And in London, we are delighted to have significant support from Samsung and MathWorks for *Mathematics: The David and Claudia Harding Gallery*, named in honour of the Hardings's extraordinary gift of £5 million to the Science Museum.

Among the most enjoyable ways of thanking our many benefactors are the annual dinners we stage in York and London. Paul Kirkman and Mary Kenny, of sponsors Eversholt Rail, welcomed 500 guests to the rail industry networking event of the year in June to celebrate NRM's 40th anniversary,

where the guest speaker was the chairman of Network Rail, Professor Richard Parry-Jones CBE. Guests at the Science Museum's dinner, including John Whittingdale MP in his first public engagement as secretary of state for culture, media and sport and Airbus UK's president Paul Kahn, heard from Professor Anne Glover CBE, former chief scientific adviser to the president of the European Commission.

More than 600 guests attended the launch of the Manchester Science Festival, which also announced the city's designation as European City of Science, past headline festival sponsors Siemens plc and the University of Salford as lead education sponsor.

During the festival, business, civic and academic leaders attended a Thought Leadership breakfast hosted by Siemens CEO Juergen Maier. Guests discussed productivity potential in the UK.



Looking forward to our forthcoming medicine galleries, we are delighted that the Wellcome Trust has agreed to award the Science Museum £10 million towards them, with £500,000 for project development. And the Heritage Lottery Fund has earmarked £8 million in funding, of which £400,000 has been received in development funding.

VIEW THIS
group.sciencemuseum.org.uk/finance/funding-with-dcms

Opposite: MSI director Sally MacDonald tries the adults-only ball pool during Manchester Science Festival with broadcaster Michael Mosley and Juergen Maier, CEO Siemens

This page: Dame Mary Archer entertains guests from Nobelists to chief scientists at the Science Museum annual dinner (main picture), where guests also included (top row) Paul Khan, chief executive of Airbus UK, with Mrs Khan... Damon and Sandra de Laszlo... Michelle Lamprecht and Sham Ahmed of MathWorks, with Charlotte Webb, SM head of corporate relationships... **Right:** SMG director Ian Blatchford's table with secretary of state John Whittingdale to his left





“ Nobody should doubt the serious contribution SMG is making to the nation’s future prosperity by enthralling record numbers of children

IAN BLATCHFORD DIRECTOR AND CHIEF EXECUTIVE OF THE SCIENCE MUSEUM GROUP

SOLVE PROBLEMS AND HELP CHANGE LIVES

The informal learning sector plays a crucial role in driving career aspirations in STEM and the Science Museum Group aims to be its national centre of excellence. In the past year 458,000 people visited the Science Museum in booked education groups – more than any other museum in the UK – while a further 147,000 visited our other museums in booked groups. SMG is a significant part of the solution to the UK’s skills shortage

One of the highlights this year for Felicity Paynter and her contemporary science team at the Science Museum was the What’s Your Angle? festival, held in partnership with the London Mathematical Society to celebrate their 150th anniversary.

Felicity said: ‘Visitors were transported into a busy 24-hour newsroom to explore ways that researchers are using maths to solve problems and change lives. They could uncover the secrets of an archaeological dig, learn how best to surf a wave and even dress up as a cow

to find out about herd health.’ More than 1200 visitors took part, with many tweeting their headlines or presenting them on camera.

The Evening Exchange, linked to the museum’s *Ada Lovelace* exhibition, piloted a new programme of free participatory events. Over three consecutive Fridays these explored computer programming beyond mathematics, and invited adult visitors to write their own interactive fiction, compose music using mathematics and create their own inventions.



Top: Make Some Noise festival at the National Media Museum

Above: What’s Your Angle was a celebration of maths



Extra funding boosts STEM in Manchester and Bradford

Contemporary science has exploded this year at the Museum of Science and Industry and National Media Museum thanks to £300,000 of funding from two government departments for a series of pop-up programmes featuring STEM subjects such as light, wearable tech, forensic science and graphene. Each hands-on festival had bespoke schools days, a family weekend and an adult Lates evening, hitting all three target audiences and attracting around 27,000 visitors.

The National Media Museum developed festivals with 40 local scientists and partner organisations to involve local communities, focusing on girls and those



from lower socioeconomic groups, building relationships with Bradford schools and colleges, and participating in British Science Week. The Make Some Noise and Light Fantastic festivals each attracted more than 4000 visitors.

MSI continues to run its popular monthly contemporary science Pi programme, Platform for Investigation, supported by Siemens. Natalie Ireland, MSI head of learning, said: ‘Pi is a portable learning pod that welcomes researchers to deliver lively STEM-based activities. Diverse themes have included nuclear reaction, the science of strokes, emotions and antimicrobial resistance.’ During the 11-day Manchester Science Festival alone a total of 6670 visitors attended Pi events.

Schools blast off with Tim Peake

The role of SMG Learning is to ignite curiosity in science. Nothing said this more loudly than the Science Museum’s live televised launch for astronaut Tim Peake in December [see inside front cover], when 70 different on-site events across 12 hours ran seamlessly from family activities into a Lates for adults.

Left: Evening Exchange at the Science Museum encouraged participants to combine music and maths

Above: Adults try out spacesuits on Tim Peake Day... Lazer Disco at National Media Museum... Researchers from London’s University of Roehampton ask visitors to Live Science ‘How much do you like to eat?’



TURNING STEM RESEARCH INTO INFLUENCE

Under its new director Tom O’Leary, SMG Learning is continuing to pursue two large research-to-practice projects, Enterprising Science and Building Bridges. These are significantly influencing our thinking and gathering evidence for the roles of museums and science centres in STEM education. Enterprising Science, a partnership with King’s College London and BP, is focused on understanding what shapes people’s attitudes towards science, with the aim of helping young people find science useful, so that it enhances their lives and improves opportunities.

The Building Bridges project, similarly focused on STEM and supported by BG Group, continues to work with

11- to 12-year-olds and their families from diverse backgrounds through 20 schools in our London partner boroughs and Reading. Through our research partnership with Sheffield Hallam University, the first phase of the project has provided evidence that regular and extended experiences have a longer-lasting impact on student attitudes to science than simpler one-off events.

Findings from both projects are shaping SMG’s teacher engagement and training courses. This year the Science Museum hosted the first Transforming Practice conference, which explored the implications of this research for the informal learning sector with 80 museum and STEM practitioners.



Changing primary school perceptions

In 2015 the Science Museum hosted the Google-funded Day at the Museum (above) for 12 primary schools, giving 600 children a day of activities with museum staff, collections and local scientists. Building on our experience with the Enterprising Science and Building Bridges projects, the Field Trip Days aimed to challenge stereotypes about the image of scientists and careers in science. The children began to see scientists as everyday men and women, to recognise the skills they need and how these relate to careers outside research and academia. One student commented on meeting a researcher: ‘We didn’t know she was a researcher... she didn’t look like a researcher... just like a normal person.’

VIEW THIS
tinyurl.com/hpd4hsl



Outreach targets new audiences

From Hong Kong to Gibraltar, the Outreach team has been busy igniting curiosity in science in the UK and across the globe. The team has worked with many different clients – from schools, to the British Council and Butlin’s – delivering shows and workshops to tens of thousands of people. Dr Kenny Webster, the Science Museum’s head of learning operations, emphasises that the focus of the Outreach team is to target under-represented audiences: ‘With projects like the Days at the Museum we have been able to involve schools that have high levels of free-school-meal entitlement and turn their pupils into museum visitors.’

Clockwise: Enterprising Science schools visit to the Science Museum... At Antenna Live, the Cowriter Robot learning system from France helps children improve their handwriting... Families attend a Building Bridges event... Transforming Practice conference for teachers at the Science Museum



HOW TO FIRE UP TEENAGE ENGINEERS



During Tomorrow's Engineers Week the National Railway Museum invited KS3 school students to workshops and demonstrations with engineers from the Institute of Civil Engineers, Institute of Mechanical Engineers, Institute of Electrical and Technical Engineers and Institute of Materials, Minerals and Mining. NRM's learning manager Kirsten Berry said: 'The museum is developing its STEM programme and discussing the future of rail engineering through our Future Engineers events in the year ahead.'

To coincide with the NRM's partnership with York Theatre Royal, we ran a summer of activities called From Steam to Stage. Themed around on-site performances of *The Railway Children*, activities included a 'make and take' about set and costume design, and *Twaddle Train* – a performance for families based on overheard train stories submitted over social media.



To maglevs and beyond

The National Railway Museum's action-packed new interactive science show, *Need for Speed*, introduces school groups aged 7–11 to the science of speed and the world's most celebrated locomotive, *Flying Scotsman*. The show moves chronologically through the development of rail transport, exploring faster and faster engines, through steam, diesel and electric to maglevs and beyond.

Early Birds and Night Owls

Following the success of the autism-friendly Early Birds programme for families, the Science Museum has piloted a similar event, Night Owls, for those aged 16–25 to explore the museum free from crowds.

VIEW THIS
tinyurl.com/jgurxmb

From top: Students at Tomorrow's Engineers Week hosted at National Railway Museum... Hands-on summer workshop at Manchester's Museum of Science and Industry... A graphene weekender for schools in the Pi Platform for Investigation at MSI

Make 'n' do proves hugely popular

The Museum of Science and Industry encouraged visitors to 'Imagine It, Make It, Move It' in a vibrant summer programme of workshops, demonstrations and shows, all linked to the theme of making. Construct a Crane workshops illustrated engineering skills with the huge cranes used on the Castlefield site in 1912, while the fun, interactive science show *Inventors Wanted* brought home the science behind innovation.

MSI also produced its first MakeFest where a host of inventors, artists, hackers, crafters, coders and makers ran workshops and drop-in sessions showing off their skills. Hugely popular with visitors of all ages, it embraced traditional crafts and the latest innovations – all with a DIY element.

Explosive new show for Manchester

With a thumping 35% increase in the Museum of Science and Industry's booked education groups in 2015, the learning team has launched a new show titled *Explosions: A Blast from the Past* where *CSI* meets *Cluedo*. It aims to illuminate the science behind bangs. Schools can also book a full-day learning experience for older pupils devoted to the concept of sound waves.





WEIRDNESS AND WONDER AT LATES

Twenty-six adult Lates events were held across the four SMG museums over the past year and 50,000 visitors took part. The format, which promotes science and participation by adults, has gone from strength to strength by partnering with leading institutions such as the Royal Society who collaborated on The Next Big Thing in Science. The National Media Museum was transformed into a crime scene for its *CSI*-themed Lates where 500 visitors became detectives and could attend an unsettlingly realistic forensic autopsy on a murder victim. This spring the National Railway Museum held its first Lates on a Roaring Twenties theme, which drew on sharing group expertise.



The graphene-themed Lates at MSI saw hundreds of adults create graphene jewellery, inspired by this wonder material's flexibility. The Cravings Lates for the Manchester Science Festival and another at the Science Museum created weird bazaars of tastes, smells and flavours that aroused, tempted and even disgusted taste buds throughout these busy evenings, complete with 'chilli busking' and 'toast modelling'. The London highlight was a panel discussion on Controlling Our Cravings

with chief medical officer Dame Sally Davies, molecular gastronomist Jozef Youssef and experimental psychologist Charles Spence, all chaired by Roger Highfield, director of external affairs.

This page: A forest of candy at the Science Museum's Cravings Lates... Visitors design spacecraft at a space-themed Lates event in the National Media Museum

Opposite: Students try reverse engineering in a STEMNET event at MSI... The National Media Museum staged *CSI*-themed events for all generations... At the Science Museum's Astronights for adults sleeping bags are essential accessory



“ Being taken around by torchlight was an interesting and entertaining way to experience the museum

ASTRONIGHTS CAMPER

Astronights in jimjams

Building on the success of Science Night sleepovers for children, Astronights for adults was launched this January. The response was eye-opening as the Science Museum welcomed 200 campers for a unique evening when they expressed their creativity in workshops, played the role of curators and explored our collections behind the scenes. They were also treated to delicious food. After they enjoyed the freedom to explore an empty museum in their pyjamas, feedback from campers was so enthusiastic that Astronights have become a fixture.

Sharing science with Europe

As part of Manchester's term as European City of Science (ECOS), the MSI learning team has been helping develop the Great Science Share as a schools project in hubs across Greater Manchester. Annie Keane, ECOS programme director, introduced the initiative at the Manchester Science Festival launch as a way of creating a buzz about the STEM ventures young people have been working on over the year. This summer's concluding event is expected to involve 60% of schools across the region.



STEMNET goes from strength to strength

In Greater Manchester the Museum of Science and Industry continues to run the UK's most successful STEMNET programme. The team works with all 164 state-funded high schools across the city's ten boroughs where 1113 STEM ambassadors delivered 1400 STEM activities, reaching 20,000 young people. The team also supports the STEM clubs running at 66% of Manchester schools.

VIEW THIS
manchestersciencecity.com





BRADFORD: A NEW WINDOW ONTO REALITY

Douglas Trumbull – one of the grandees of science-fiction film-making, director of *Silent Running* and the special effects guru behind *2001* – delivered the keynote speech at this year's Widescreen Weekend at the National Media Museum in Bradford.

Drawing on his extensive knowledge of the film industry, Trumbull outlined his vision for the next steps in the evolution of cinema presentation. Having travelled the world exploring and comparing projection systems, he has come to the conclusion that increasing on-screen frame rates – the number of individual images passing in front of the eye each second – could revolutionise the way audiences experience cinema.

'I discovered that by changing the frame rate dramatically – to 120 frames per second and using 4K cameras and 4K projectors available off the shelf and running them at 60 frames per second, which is standard on most of them, a completely new cinematic effect emerges, which is like a window onto reality.'

Trumbull demonstrated his unique MAGI process, including 3D imagery,

on NMeM's Pictureville screen. While increased frame rates have been a talking point for some recent high-profile film releases, Trumbull's system goes far beyond what the industry is currently contemplating. In the face of advances in downloading, streaming and digital technologies, he argued, cinema has to reinvent itself once again to offer audiences a unique storytelling

spectacle. His aim is to remove any sense of a screen and create an image which the audience can perceive as reality.

Above: Douglas Trumbull revealing his secrets to the Bradford audience

Below: Paul Franklin entertains a packed Pictureville with stories of the making of *Interstellar*, which won him a second Oscar for Best Visual Effects – his first was for *Inception*



VIEW THIS
nationalmediamuseum.org.uk/
widescreen-weekend

MANCHESTER: A FESTIVAL OF CREATIVITY AND PLAY

The ninth Manchester Science Festival (MSF) recorded its highest level of visitor attendance last autumn with almost 120,000 people taking part in this 11-day city-wide celebration of contemporary science. It is proudly produced by the Museum of Science and Industry with headline sponsorship from Siemens plc as part of its Curiosity Project. Launched in conjunction with the announcement of the city's designation as European City of Science 2016, MSF 2015 was hailed by the *Manchester Evening News* as 'truly wonderful'.

More than 600 VIPs including SMG chairman Dame Mary Archer and celebrated 'gastronaut' Stefan Gates attended the official launch at the museum. Linking to the opening of

the festival were two new exhibitions: *Cravings*, a Northwest version of the Science Museum's original, and *Evaporation*, a sculptural celebration of the world's seas and oceans, created by artist Tania Kovats, which Nancy Durrant of *The Times* found 'wonderful'. Renowned composer Jonathan Dove created a new piece inspired by Kovats's work, performed live from the heart of the gallery during the festival's opening weekend.

Experiments, debates, comedy, theatre, music, drones, a food-themed Lates event and a recording of Radio 4's *The Infinite Monkey Cage* with Brian Cox entertained the festival audience. But it was a white box, filled with 81,000 white balls, that helped the festival to trend on social media. Jump In!, the festival's adults-only ball pool, tempted Cox, Dame Mary Archer and the University of Manchester's Dame Nancy Rothwell to cast aside their inhibitions and 'jump in for science', celebrating the themes of creativity and playfulness.

VIEW THIS
tinyurl.com/jphy8cb

A truly wonderful region-wide festival of science that introduced all ages to cutting-edge ideas

MANCHESTER EVENING NEWS
ON THE 2015 SCIENCE FESTIVAL

Clockwise: Tania Kovats and Jonathan Dove in the *Evaporation* exhibition... *Cravings* explained at MSI... and 'gastronaut' Stefan Gates demonstrating



DIGITAL HERE, THERE AND EVERYWHERE

Interactive experiences underpin everything we do



From interactive exhibits to mobile games and from websites to social media, the Science Museum Group has a long history of innovative digital initiatives. Building on this, 2015 saw its first digital director John Stack aiming to 'embolden our ambition to make digital a part of everything we do'.

Recognising that digital technologies continue rapidly to transform audience behaviour and afford our museums new ways to fulfil their missions, the group launched a new multi-year digital strategy. This has five ambitions:

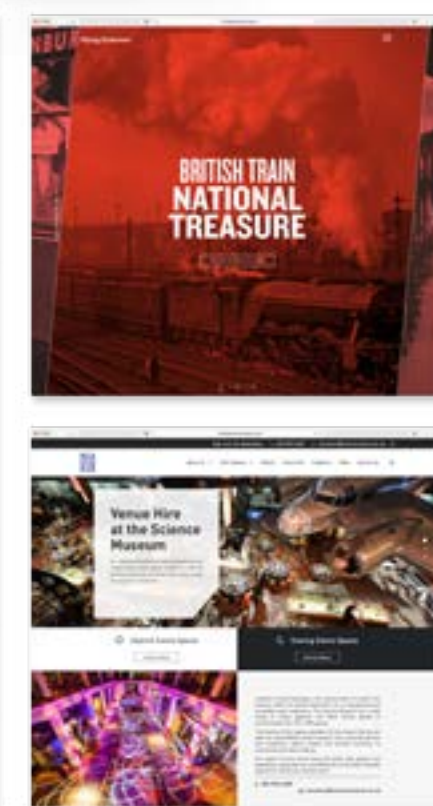
reworking audiences' digital experiences before, during and after their visits; scaling up our commitment to digitisation of the collection and creating open resources that audiences can reuse; interpreting the stories behind the collections; establishing a digital culture throughout the organisation; and ensuring that such initiatives are underpinned by a robust technical infrastructure.

A large-scale overhaul of the group's websites is well under way. New websites have been launched for the

Museum of Science and Industry, *Flying Scotsman*, the Science Museum Group and Science Museum event hire. The museums' blogs were relaunched with bold images and multimedia. The blogs will provide a platform for telling the behind-the-scenes stories of our museums' work and for the voices of those working in the group.

To promote *Cosmonauts*, as for most major exhibitions, a series of online videos introduced its themes, personalities and background. For the *Ada Lovelace* exhibition an interactive

VIEW THIS
sciencemuseum.org.uk/online_science/games
group.sciencemuseum.org.uk
hirethesciencemuseum.com
flyingscotsman.org.uk
blog.nrm.org.uk
msimanchester.org.uk



digital archive was developed to enable visitors to view letters, documents and technical drawings, and to explore Lovelace's interest in Charles Babbage's innovations in computing and their later collaborations. Visitors could zoom in and examine the documents on a 32-inch, high-resolution touch screen, in unprecedented detail.

It's been a lively year for the *Rugged Rovers* game from the *Engineering Your Future* exhibition with downloads of the app exceeding 170,000. In June it was a gold winner at the prestigious Serious

Play Awards; in October a gallery version was installed at MATLAB Expo at Silverstone; and in December it travelled to the Franklin Institute in Philadelphia, United States.

A number of bespoke digital pieces were created for the *Cravings* exhibition in *Antenna*, including the Kandinsky Salad Film, a triptych video at the start of the exhibition that shows how chef Charles Michel created a salad inspired by a Wassily Kandinsky painting. Also on offer was *Craving Commander*, a quick-fire quiz that asks visitors to approve or reject

provocative statements on society's role in controlling eating behaviour. This has been a very popular digital interactive with more than 83,000 plays and counting.

Opposite: *Craving Commander*, a digital interactive for exhibition visitors... and *Rugged Rovers*, now enjoying success as a downloadable app
 This page: Recently overhauled web pages showing SMG's online diversity from a new group website on all platforms (top) to MSI's new look (centre)

SMG SCHOLARSHIP: A NEW PLACE FOR EXCHANGING IDEAS



Research fellow Stuart Butler



Robert Bud at the Centre's inaugural conference



Research fellow Barry Murnane



Background: The new Dana Research Centre and Library



The increased commitment to scholarship seen within the Science Museum Group under its director Ian Blatchford was marked early in 2016 by the opening of the stunning Dana Research Centre and Library in London.

An elegant reading room, designed by award-winning Coffey Architects, provides a calm space where our growing community of scholars and students can pursue research into our collections, and access our library and archive collections. Research fellows and students collaborate on the floor above, exchanging insights and mutual guidance arising from the several dozen projects now under way.

The Research Centre marked its opening with a major conference, bringing together scholars to discuss the current state and future potential of research and how it transforms all areas of our museums' activities, including understanding collections and audiences and how to care for the objects we hold. More than 50 speakers, including SMG staff and students, research associates and collaborators, and senior academics

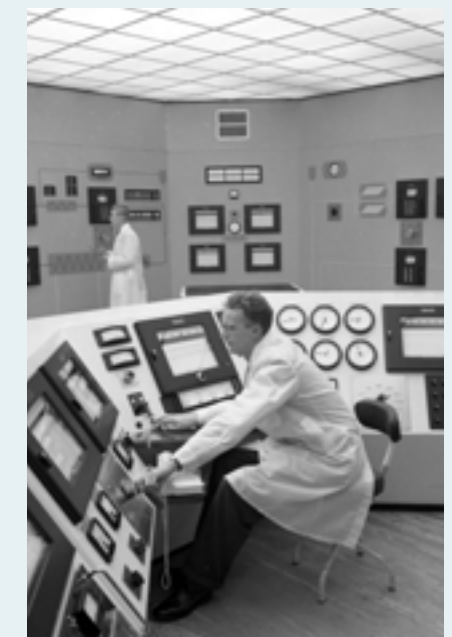
from the UK, Europe and America, explored many fascinating aspects of the power of objects, our museums' role in culture and the relationship of science and technology to the arts.

Welcoming visiting fellows to the Science Museum

The museum's fellowship and associateship programme is thriving. Dr Barry Murnane is the first TORCH-Science Museum fellow, a scheme under which members of Oxford University's humanities faculty come to work at the museum. Barry is contributing to research for the new medical galleries, focused on the history of respiratory medicine. Another fellow is Stuart Butler, with us in the Research Centre for two years, studying the history of civilian nuclear power in Britain as part of a major EU-funded project. Our own Dr Robert Bud is completing a second fellowship funded by the Arts and Humanities Research Council (AHRC), this time exploring the history of the idea of applied science. This project included a major conference on science and modernism, held in conjunction with the Institute of Historical Research.

“The benefit that these new spaces provide to fulfilling our research ambitions is incalculable

IAN BLATCHFORD SMG DIRECTOR



The latest event in the museum's exploration of science, technology and music was October's promenade conference Objects at an Exhibition. A joint enterprise between the museum, NMC recordings and the Aurora Orchestra, it featured six new commissioned pieces inspired by objects and spaces in the museum. The composers included Barry Guy, Thea Musgrave and David Sawer.



Clockwise: The Aurora Orchestra at the Objects at an Exhibition conference... Nuclear power in Britain as focus of Stuart Butler's research... National Media Museum curator Colin Harding at the Research Centre inaugural conference

SMG SCHOLARSHIP: MORE AWARDS FOR THE GROUP



Doctoral research students are pursuing studies across the Science Museum Group; a total of 24 studentships have been awarded under the first tranche of funding from the Arts and Humanities Research Council, and we have already agreed the first six in our second three-year award. Under this new award we

welcome the Royal Society and the Royal Geographical Society to our consortium, in addition to BT Archives. Several of the successful projects will draw on material from these collections.

Current students include Rebecca Smith, who is undertaking the first in-depth

study of the National Media Museum's *Daily Herald* archive of around 3 million images. This is a rare relic of Fleet Street photographic practice, still kept in the working order employed by the newspaper, which closed in 1964. Paul Coleman in Manchester contributed to the Spark of Life study day held in



The *Science Museum Group Journal* has recently published its fifth issue online. With a combination of articles and comment pieces written by external researchers as well as SMG staff and students, the e-journal is rapidly establishing itself as the ideal place to publish scholarship on the role of museums, the histories of objects and approaches to studying audiences. In a new departure, this issue included pre-publication of some of the provocative plenary presentations from the inaugural conference.

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



collaboration with Wellcome Collection, drawing on his research into high-voltage electricity to inform the development of an upcoming exhibition.

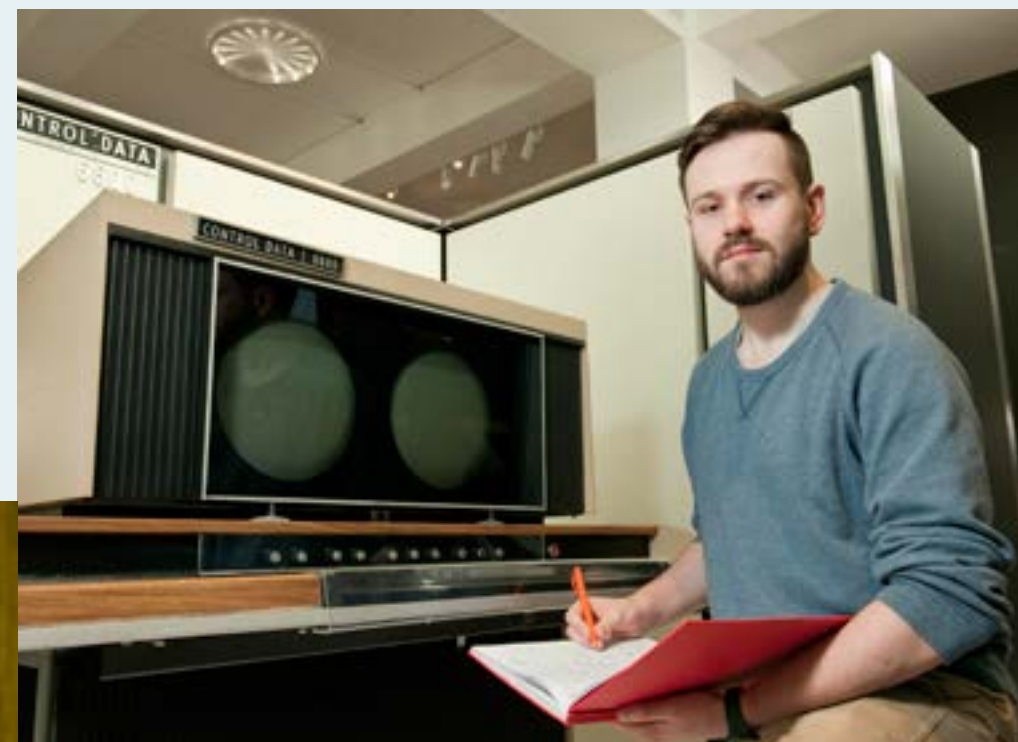
In Manchester, the Museum of Science and Industry has explored new ways of working with its local academic and student communities, notably participating in the University of Manchester's REALab which asked partners to set challenges for postgraduate researchers. The interdisciplinary team which responded to the museum's brief won first prize and has gone on to produce a consultation report.

Conferences and events have driven forward research collaborations at all our museums; at the National Railway Museum in York, expert historians,

archivists, genealogists and even a singer explored the fascinating lives of railway workers across history in *Work, Rest and Play: Exploring the Extended Railway Family*. The conference was organised in partnership with family history event organisers Your Fair Ladies.

NRM has made key appointments to develop the museum's research programme. Dr Oliver Betts, research fellow, is taking an active role in building academic partnerships and advising on research input to NRM's Masterplan. Angélique Bonamy, associate curator of film and sound, is doing exciting work, exploring the museum's little-known moving image and sound recordings.

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



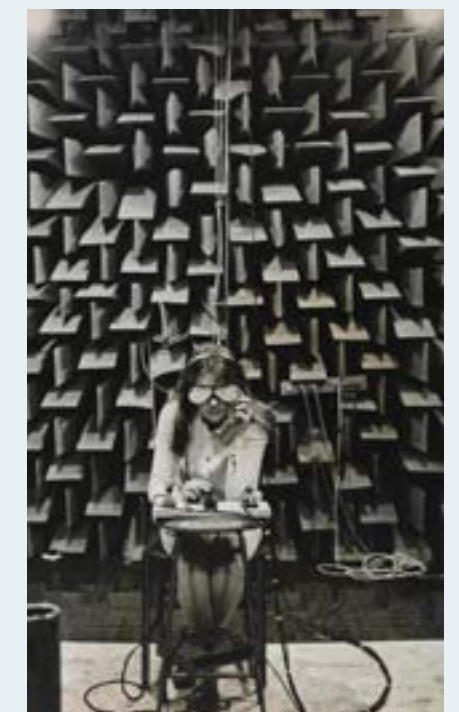
In Manchester MSI has explored new ways of working with its local academic and student communities

TIM BOON HEAD OF RESEARCH AND PUBLIC HISTORY



Opposite: The NRM's *Work, Rest and Play* conference... Manchester research student Paul Coleman

Clockwise, this page: NRM head curator Andrew McLean's book *Flying Scotsman: Speed, Style, Service...* Medical research in a soundproof room in 1969, from the *Daily Herald* archive, subject of Rebecca Smith's research... At NRM research fellow Dr Oliver Betts and associate curator of film and sound, Angélique Bonamy... Science Museum research student Jacob Ward who is studying 20th-century telecommunications





PHOTOGRAPHIC DAZZLERS ACROSS THE GROUP

Setting the lead among the UK's dedicated gallery spaces

Two of the *Guardian's* top ten photography exhibitions of 2015 were created by the Science Museum Group. *Gathered Leaves* took the top spot, whilst *Revelations: Experiments in Photography* followed in third place. *Revelations* drew on Science Museum and National Media Museum collections to showcase the huge influence of scientific endeavour on the visual arts. As London's leading photographic gallery, Media Space at the Science Museum hosted *Gathered Leaves*, the first major UK show by one of the world's restlessly experimental photographers, Alec Soth. His renowned 'unselfies' led to a takeover of the Media Space Instagram channel for a week and undoubtedly advanced the museum's reputation for innovation in digital media.

In December, the National Media Museum published some rarely seen images of Frank Sinatra to mark the showman's centenary. These gems from the *Daily Herald* archive were revealed showing the many sides of 'The Sultan of Swoon'. To mark the release of the gripping new

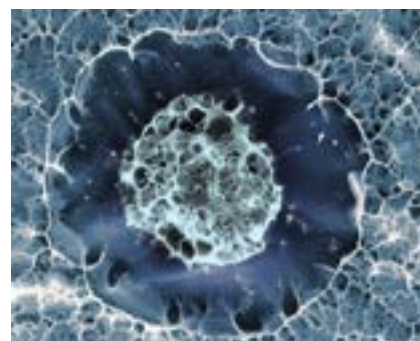
IMAX film *Everest* we displayed images from our collection of Edmund Hillary and Tenzing Norgay in 1953 when they became the first people to stand on the roof of the world.

This spring the vibrant annual Wellcome Image Awards, showcasing the best in science image-making, went on show simultaneously at the Science Museum and at MSI and science centres elsewhere. These astonishing images are chosen from all disciplines, among the most exciting showing the inside of a human stem cell; bacteria on a one-atom-thick slice of graphene; a premature baby receiving light therapy; and two intriguing views inside the human eye.

At the National Railway Museum, locomotive enthusiasts were invited outside opening hours to capture their own pictures of the world-famous *Flying Scotsman* while the locomotive itself was displayed in light steam to create an authentic atmosphere.



From top: Alec Soth speaks at the opening of *Gathered Leaves*... Rarely seen photographs of Frank Sinatra were given a showing in Bradford... False-coloured cryogenic scan of human stem cell from this year's stunning Wellcome Image Awards exhibition



VIEW THIS wellcomeimageawards.org/2016

LIGHTHOUSE KEEPER TURNS STATIONMASTER



In January 2015 Gary Campbell blew the whistle at the Shildon platform of the National Railway Museum, after three years at the Museum of Scottish Lighthouses in Fraserburgh as its informal 'principal lighthouse keeper', by kick-starting a year full of exciting developments, major events and significant milestones. Locomotion, the museum jointly run by SMG and Durham County Council, welcomed to the team new expert education and volunteer development professionals, and the museum's ever-popular public programme is flourishing as a result.

Diversification introduced an inaugural Steampunk event that brought in a whole new audience, as well as a Diamond Deltic event supported by Locomotion Models that celebrated 60 years of the post-steam icon.

Locomotion celebrated the National Railway Museum's 40th anniversary at its highlight Autumn Steam Gala, followed soon after by the arrival of its landmark 2 millionth visitor, 11 short years after opening – an incredible achievement for a museum initially expected to attract 40,000 annual visitors. Simon Chambers,



who was astonished to learn that he and his family were the lucky guests, said of Locomotion: 'It is a great attraction for the Northeast. We love all the activities at the museum, there's always something different happening. The museum keeps the children interested in our heritage.'

The first Stockton and Darlington Railway Conference attracted speakers and delegates from throughout the UK, and marked the first step on an exciting ride towards the 200th anniversary of the S&DR in 2025.

Looking back on his first year, Gary said: 'With the shift from the sound of the foghorn and the flicker of the light to the sound of the whistle and the smell of the smoke well under way, I'm confident that a certain green locomotive will complete my transformation into a stationmaster in 2016!'

VIEW THIS nrm.org.uk/planavisit/events/shildon-train-rides

Clockwise: Locomotive 777 provides a passenger service at the Steampunk event... Volunteer working on the 2HAP in the Shildon workshops... New manager Gary Campbell amid the Shildon collection



THE GROUP UNITES ITS COLLECTIONS

As newly appointed group head of collections services, Jack Kirby tells of significant improvements to the care of SMG collections

This year the Science Museum Group brought together teams that were previously separately managed into a new national collections services department. Comprising all the people who conserve, care for, document and digitise objects, the new department symbolises the group's bold decision to manage its wide-ranging collections as one for the first time.

Working in closer collaboration across the group is enabling and increasing sharing of skills and experience. As the three northern museums develop their Masterplan projects, the experience of the Science Museum conservation team in delivering large capital projects is helping colleagues to plan the extensive work that goes into moving and re-presenting objects in new exhibitions and galleries.

Exhibitions and Masterplan projects drive most tasks for collections services. The highlight of the year was undoubtedly *Cosmonauts*, where legally and logistically complex loans from Russia were skilfully negotiated, and creative solutions found to the challenge of bringing large and sometimes hazardous items into the Science Museum. Already attention has turned to the future, with extensive cleaning and preparation of 300 metal pieces that will be reassembled



for the first time in decades to make up the Automaton Lathe, which will be a highlight of our *Robots* exhibition in 2017.

As part of the Science Museum's Masterplan, the team tackled the extraordinary challenge of packing and moving 6500 objects from the former medical galleries. The whole museum joined in to help, with 150 people from trustees and patrons to explainers and security staff receiving special training then



rolling up their sleeves. This help meant that the team could concentrate on fragile objects such as anatomical waxes, which were carefully supported using clingfilm, plaster of Paris and bandages for their move down six storeys of the museum.

Each year thousands of items are lent to other museums for display [see page 64], and ensuring that these remain in good condition is paramount. The National Media Museum's conservator repaired a tear in an early negative on tour in the exhibition *Captain Linnaeus Tripe: Photographer of India and Burma, 1852-1860*. The skilled repair meant that the 157-year-old image was seen in Washington DC, New York and London.

At the Science Museum, a loan from the Wellcome medical collection to the Chhatrapati Shivaji Maharaj Vastu Sangrahalaya in Mumbai, India meant the team of object registrars had to ensure that the legal conditions of export were met.

Opposite: Touring abroad, photograph of a ruined temple in India, taken by Linnaeus Tripe in 1854... Conservators Sophie Oelman and Jerrod Seifert preparing the 'rose engine' lathe for display in the forthcoming *Robots* exhibition

This page: Conservator Kate Perks helping install the *Cosmonauts* spacesuits display... Natasha Logan and Mayuko Kai removing objects during the major decant from the Science Museum's former medical galleries

NEW DIRECTION FOR COLLECTIONS



Safety is the first priority across the Science Museum Group, and historical science collections often contain hazardous materials that would be avoided or subject to licensing today. The group's expertise in this area is recognised as leading best practice, with the collections hazards adviser involved in a partnership project to create an e-learning tool for museums.

In Manchester's Museum of Science and Industry a year-long project has been completed to reassess 16,000 objects (97% of the relevant collection) for hazards such as asbestos and explosives. Specialist contractors have made objects safer where necessary, while retaining as much original material as possible to preserve an artefact's integrity. The overall result is a collection that is ready for use by future exhibitions and researchers.

In York the National Railway Museum has focused conservation on the dynamometer car, a special railway

vehicle for measuring a locomotive's speed. Built in York in 1905, the car authenticated the record-breaking 100 mph run of *Flying Scotsman* in 1934, as well as the unsurpassed 125.88 mph set in 1938 by fellow Gresley-designed locomotive *Mallard*.



Most of the group's activity is focused on stabilising the condition of objects, but occasionally restoration is appropriate. Here the team at Locomotion, the National Railway Museum at Shildon, comes into its own. Staff and volunteers are restoring the legendary 1960s Deltic



locomotive *King's Own Yorkshire Light Infantry*, affectionately known as 'KOYLI'. The locomotive featured in NRM's *Scotsman* season before operating on heritage railway lines.

In the digital sphere, expectations of both museum visitors and specialist researchers are rising: people expect to be able to find images of the group's objects online. Looking forward, plans are being drawn up for an extensive programme of digitisation that will support a new collections online interface. While most artefacts will have a traditional photograph, technologies

such as 3D scanning and rendering will enable visitors to explore star objects close up.

New head of collections

Meanwhile, Tilly Blyth has been appointed head of collections and principal curator for the Science Museum. Tilly joined the museum in 2004 as curator of computing, before becoming keeper of technologies and engineering in 2012. Most recently, she was the lead curator for *Information Age*, our biggest and most ambitious new gallery to date, as well as editor of the accompanying book, *Information Age: Six Networks that Changed Our World*.

“The digitisation programme will lead to the group's collection being more accessible both to staff and online visitors

JACK KIRBY GROUP HEAD OF COLLECTIONS SERVICES



Opposite: Painting the roof cooler of 'KOYLI' in the NRM workshops... SMG touring exhibitions include *Collider*, launched by curator Harry Cliff at the ArtScience Museum, Singapore, and the George III collection *Science and Splendour* in South Korea which included this 18th-century silver microscope by George Adams (this page above)

This page: The NRM's refurbished 1905 dynamometer car... Newly digitised postcard for G L Temple at Hendon, from the Penn-Gaskell Collection illustrating the development of international air post



“ Truly glorious. Seeing fully grown men and women getting over-excited was both heart-warming and infectious

NORTHERN SOUL WEBSITE REVIEWING PLAY IT!



FRESH LEASE OF LIFE FOR ENTERPRISES

From gaming to iconic Soviet art, the group is bursting with entrepreneurs

‘This year Enterprises has launched some exciting new projects,’ says Michelle Lockhart, commercial director, ‘from the upgrade of our IMAX cinema at the National Media Museum to our new improved Miniature Railway Ride at the National Railway Museum which has taken 50,000 passengers through the collection in the re-landscaped South Yard. We also began work on the design to convert the fourth and fifth floors of the Science Museum into a new dedicated corporate events space.’

Significant successes of the year were screenings of the new *Star Wars* episode *The Force Awakens* in the group’s two IMAX cinemas. In London it proved the Science Museum’s most successful



cinema film ever, showing on Europe’s only 15/70 IMAX screen. More than 26,000 people attended, netting £339,000 at the box office, plus another £35,000 in popcorn and drinks sales. *Batman v Superman* followed over Easter.

In Bradford, our IMAX enjoyed a £780,000 upgrade – thanks to a loan from the Department for Culture, Media and Sport – which created state-of-the-art digital projection, high-spec sound,



the region’s biggest screen and luxury seating. A new record was achieved when audiences for *The Force Awakens* totalled 19,000 to make ours the best performing Picturehouse in the country for *Star Wars* sales.

To celebrate the Science Museum’s blockbuster exhibition *Cosmonauts*, the retail team produced a beautiful catalogue, exclusive prints and a selection of limited-edition merchandise for a bespoke shop and online range. This included replicas of the first Sturmskie watches – the first watch in space worn by Yuri Gagarin and the first spacewalk watch worn by Alexei Leonov. The *Cosmonauts* shop took £624,000, making triple the original profit forecast.

Our *Flying Scotsman* retail range drove e-commerce sales up 135% and revenue up 120% compared with the previous year. Visitors to the National Railway Museum also packed our *Countess of York* café for *Flying Scotsman* afternoon teas. The carriage, built in 1956 and restored in lavish style, receives appreciative reviews on TripAdvisor – and is currently ranked 15 out of 657 restaurants in York.

Enterprises has hosted ever more hands-on activities, notably when the Museum of Science and Industry mounted its first live retro and interactive gaming event, Play It! A collection of 120 playable consoles told the evolutionary tale of gaming and drew 13,000 visitors. By popular demand, Play It! returned

Highlight at Locomotionmodels.com: Exclusive Edition Bachmann Diamond Deltic models of DP1 in east coast main line livery and KOYLI in BR blue, from £130 – to link with the Diamond Deltics event at Locomotion in October 2015.



over Easter and a similar event follows at the Science Museum.

The events team had great success at the NRM with their Christmas packages and exclusive nights, selling 4690 covers, while the Science Museum hosted 200 commercial events across the year which were attended by 30,000 guests.

Opposite, from top: Retro gaming in Play It! at MSI... NRM’s improved Miniature Railway Ride... Christmas party at NRM as a corporate hire

This page, clockwise: Afternoon tea in the Countess of York café... Bespoke souvenirs and cakes in the *Cosmonauts* shop and café at the Science Museum... *Star Wars: The Force Awakens*, a hit in both SMG IMAX cinemas

FINE MINDS ON SHOW

The Science Museum this year celebrated three cultural giants and the acquisition of an exquisite collection

What makes science tick

The marriage of the oldest horological collection in the world and the world's greatest science museum was a time for royal celebration. And Princess Anne obliged by formally opening the Clockmakers' Museum in its new home, a second-floor gallery granted on a 30-year lease by the Science Museum.

This collection of more than 1000 watches, 80 clocks, 25 marine chronometers, fine sundials and examples of hand engraving maps a story of innovation from 1600 to the present day. It was assembled by London's Worshipful Company of Clockmakers and located in the Guildhall until its enforced closure in 2014. Prime among its treasures are a four-month-duration long-case clock by the father of English watchmaking, Thomas Tompion; and the fifth marine timekeeper completed in 1770 by John Harrison – the last in the series he made while attempting to win the famous £20,000 Longitude Prize.

[VIEW THIS](#)
clockmakers.org



Clockwise: The Princess Royal touring the Clockmakers' Museum with curator Sir George White... Albert Einstein sculpted by Jacob Epstein... The Ada Lovelace display of calculating machines... Media Space assistant Lizzie Bracegirdle with the Iago portrait by Julia Margaret Cameron

Cameron the revolutionary

An exhibition in the Virgin Media Studio celebrated the bicentenary of pioneering Victorian photographer Julia Margaret Cameron and included the only existing print of the iconic portrait *Iago*. Cameron's portraits of influential artistic and literary friends, acquaintances and family members including Alfred Tennyson, Thomas Carlyle, William Holman Hunt and several striking photographs of her niece Julia Jackson, mother of Virginia Woolf, both revolutionised photography and immortalised the Victorian age. Describing this founding figure of modern photographic portraiture, SMG's head of photography Kate Bush said: 'Her closely framed faces, bold, expressive and minimal, are as radical and visionary as the woman who created them.'



“Exciting things are happening at the Science Museum in London but we're equally ambitious for our own Northern Powerhouse — our museums in Manchester, Bradford, York and Shildon

DAME MARY ARCHER CHAIRMAN OF SMG TRUSTEES



Einstein's remarkable legacy

A century after Einstein published his general theory of relativity, the museum celebrated his achievements in *Einstein's Legacy: How Albert Einstein Changed the Way We See the World*. This display explored his influence through fascinating scientific and cultural artefacts, while two films explored how his general theory of relativity for ever altered the way we see the universe.

Pioneer ahead of her time

A free exhibition celebrated the bicentenary of another pioneering Victorian, Ada Lovelace, champion of the computer. Lead curator Dr Tilly Blyth noted that 'the exhibition revealed how Ada's determination, knowledge and unbridled vision enabled her to anticipate the computer age a century ahead of her time'. Lovelace's portraits, letters and notes, including the first published algorithm for the Analytical Engine, were displayed alongside the calculating machines with which she worked. Difference Engine No. 1, a prototype built c. 1832 by Charles Babbage, was shown with the Analytical Engine, which was the focus of Lovelace's work and imagination. A digital display featured drawings and letters from the Science Museum's Babbage archive, the British Library and the Bodleian Library. A series of accompanying evening events explored how technology can fuel the art.





LEADING ROLE FOR THE EXPERT VOLUNTEER

When it comes to harnessing the passion and energy of volunteers, this has been a record year for volunteering across the Science Museum Group. During the past year 850 volunteers contributed 71,930 hours of their time, skills, knowledge and enthusiasm to help us improve the visitor experience, care for the collection and help out behind the scenes.

In London the launch of *Cosmonauts: Birth of the Space Age* provided the catalyst for the most ambitious volunteering project to date. A total of 114 volunteers from 21 countries and a diverse range of backgrounds, including doctors, journalists and engineers, provided 5833 hours of their time sharing their

expertise with visitors by wandering through the exhibition [see page 15].

Yet director of people and culture Judith McNicol feels there is potential for volunteers to make an even bigger contribution to our success: '*Cosmonauts* gave us a glimpse of how volunteers offer extraordinary potential to improve our visitors' experience of our museums. With a new group-wide strategy in place, more volunteers will be delivering tours, supporting school visits, maintaining our historic engines or surveying the art collection.'

This year saw the launch in Manchester and York of Volunteering for All, a new

Cosmonauts exhibition volunteers

'It was fantastic to hear so many great stories from the visitors and touching to see how emotional some were when they recalled, for example, waving to Yuri Gagarin in Hammersmith as he drove by' – Shivani Patel, *Cosmonauts* engagement volunteer

forum that brings staff and volunteers together – one of many new initiatives across the Science Museum Group designed to improve and grow volunteer involvement.

Veteran takes charge of Scotsman

New roles were developed for volunteers at the National Railway Museum ahead of the *Flying Scotsman* season, when more than 60 volunteers helped with diverse duties from communications and educational visits to the historic inaugural run between London and York. Rob Tibbits has been a volunteer at the NRM since the museum opened, and was given the privilege of being train manager on board *Scotsman* for the big event.



Priceless feedback in Manchester

At the Museum of Science and Industry volunteers played a key role in festivals throughout the year, supporting Light Fantastic, MakeFest and Play It! events, as well as across the city during Manchester Science Festival.

Penelope Hill, Manchester Science Festival coordinator, said: 'Our volunteers play a hugely important role as the public face of the festival. Their interactions with the audience provide us with priceless feedback about events and the Festival experience.'

In addition, MSI's Inspiring Futures project continues to be a huge success. Its focus on health and wellbeing has helped the museum create more diverse, accessible volunteering opportunities and saw the team finish runners-up in the Spirit of Manchester Awards.

Widescreen comes into its own

Volunteer opportunities continue to grow at the National Media Museum. This year a new team was recruited for Widescreen Weekend, which ran successfully as a stand-alone event for the first time, as well as at the CSI: Bradford and Light Fantastic contemporary science festivals.

VIEW THIS

sciencemuseum.org.uk/about-us/support-us/volunteering
nrm.org.uk/NRM/GetInvolved/Volunteer
msimanchester.org.uk/work-with-us
nationalmediamuseum.org.uk/getinvolved/Volunteer

Volunteers offer extraordinary potential to improve our visitors' experience

JUDITH MCNICOL
SMG DIRECTOR OF PEOPLE AND CULTURE

Volunteers across SMG, clockwise: The experts who excelled during *Cosmonauts* at SM... Widescreen Weekend team at NMeM... Veterans at NRM in York... MSI's GEC archives in Manchester



FINANCIAL OVERVIEW: STRENGTH THROUGH NEW INCOME SOURCES

Jonathan Newby, SMG deputy director and chief operating officer (pictured), on the growth in visitors and other revenues



Jonathan Newby: behind him, the exclusive posters commissioned for the *Cosmonauts* shop

The chancellor announced the outcome of the latest Comprehensive Spending Review in his autumn statement in November 2015, and it was greeted with much relief in the heritage and cultural sector. As we had feared a further round of deep and potentially very damaging cuts, the flat-cash settlement for the next four years was better than even the most optimistic of us had expected. It was good news indeed, and a real recognition of the wider economic impact that museums and galleries have in the UK. However, adjusted for inflation, it is still a cut in real terms and comes after a period of near unprecedented reductions in government funding in recent years. The better-than-hoped-for settlement does not mean we are out of the woods yet, but the immediate future looks much less bleak and much more stable.

Further reason to be optimistic is that visit numbers continue to increase and 2015–16 saw another record year across the Science Museum Group with more than 5.5 million visits to our five museums. The Science Museum in London set its own record with

3.3 million. Focus on the STEM agenda and on exhibitions has driven growth at both the National Media Museum and the National Railway Museum.

More visitors tend to create more income from our commercial activities, and the year delivered a strong performance. SMG Enterprises delivered a profit contribution to the group of £3.0 million, which was a significant year-on-year improvement. Retail sales were particularly strong, boosted by the huge success of the *Cosmonauts* shop, which yielded £624,000. Locomotion Models, which is managed out of the National Railway Museum at Shildon, also brought successful new products to market last year, while the upgraded miniature railway at York has beaten its first-year target.

The exhibition touring team has also continued to build on its successful business model by extending the international tours of *Collider* and *Science and Splendour*.

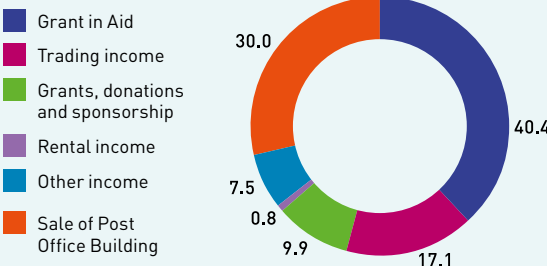
Outside of our pure museum business,

SMG concluded several significant commercial deals in the past year. In April 2015 we completed the sale of the Post Office Building to Imperial College London and the proceeds will be used to fund much-needed infrastructure work across the estate. This original home of the Meteorological Office in Exhibition Road had been used mostly for office accommodation. At our large-object store in Wroughton, Wiltshire, which is a 550-acre former Second World War airfield, we have built a 61-megawatt solar array in partnership with Swindon Borough Council and British Solar Renewables, which will deliver significant and much-needed income for many years to come. Long may the sun shine!

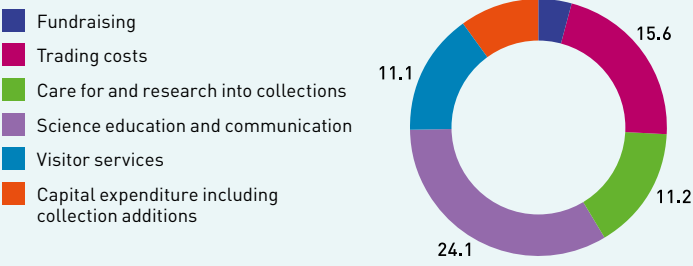
Sadly we have said goodbye to two colleagues who have played vital roles in ushering in the biggest transformation of the group since it was established. My predecessor as deputy director of the Science Museum, Jean Franczyk, is becoming the director of the Chicago Botanic Garden and Sue Fisher, director of development, is moving to Ampleforth College. We wish them both well.

GROUP FINANCIAL SUMMARY 2015–16

Income 2015–16 (£m)



Expenditure 2015–16 (£m)



Income in 2015–16 received a significant and exceptional boost from the sale of the Post Office Building. SMG was given permission by DCMS and HM Treasury to retain the proceeds of this sale, which will be used for infrastructure improvement over the coming years, as well as enabling the construction of a new interactive gallery at the National Media Museum in Bradford.

We have continued to benefit hugely from our generous supporters – sponsors, trusts, foundations and individuals – who have together made possible the wide range of programmes across our museums in 2015–16, from the opening of *Cosmonauts* to the relaunch of *Flying Scotsman*. In particular, our visitors have made a huge difference, with record income from on-site donations exceeding £3 million.

Our core government funding fell again in real terms in 2015–16, however the autumn statement in November 2015 set out a more stable funding environment for the museums sector over the course of this parliament. Whilst we will experience a cut in real terms over the coming years, the funding settlement provides a strong foundation on which to plan for the future.

We have maintained our focus on income generation during 2015–16. Excluding exceptional income from the sale of the Post Office Building, self-generated income represented 47% of total incoming resources this year. Profit from our commercial activities increased slightly. This income was supplemented by ticket income from our paid-for exhibitions, especially *Cosmonauts* and *Leonardo*, and from our international exhibition touring programme.

Our success in generating commercial income together with the generosity of our supporters has enabled us to continue to balance our budgets without compromising on either visitor experience or the care of our collections. This has required a continued focus on cost reduction strategies, and we will continue to seek efficiencies in every area of our operations over the coming years in order to deliver the optimum experience for our visitors across all our museums.

These figures are extracted from management accounts at 31 March 2016 and were published prior to statutory accounting adjustments and external audit.

The full Annual Report and Accounts is published in July each year and is available on our website: <http://group.sciencemuseum.org.uk>

SMG VISIT NUMBERS 2015–16

Total number of visits to the museums	Science Museum	NRM York	Museum of Science and Industry	National Media Museum	NRM Shildon	All Science Museum Group
Outturn 2014–15	3,348,000	727,000	680,000	414,000	167,000	5,337,000
Outturn 2015–16	3,419,000	750,000	707,000	460,000	213,000	5,549,000

Visits in education groups	Science Museum	NRM York	Museum of Science and Industry	National Media Museum	NRM Shildon	All Science Museum Group
Outturn 2014–15	452,000	40,000	65,000	33,000	5,000	595,000
Outturn 2015–16	458,000	30,000	73,000	30,000	7,000	605,000

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

THE YEAR'S HIGHLIGHTS

The Science Museum Group attracted a total of 5,549,000 visits during the past year (+4%), among which 605,000 people (+6%) visited in booked education groups.

The Science Museum enjoyed 3,419,000 visits (+2%) – the highest attendance in the museum's history – and welcomed 458,000 visitors in education groups, of which 390,000 were children and young people, a new record for a UK museum.

The National Railway Museum (York and Shildon) enjoyed increases at both locations and achieved a total of 963,000 visits during the year (+8%).

The Museum of Science and Industry also achieved a record with 707,000 visits (+4%) which included 73,000 in education groups, itself a 12% annual increase.

The National Media Museum saw a strong rise to 460,000 attendances (+11%), including 30,000 visits to hands-on events in a nine-day partnership with Horrible Science books.

SMG's digital audience: The group also recorded its best ever year for website visits, with 12.47 million sessions in 2015–16. The methodology for reporting web visits has changed so year-on-year comparison is not possible.

According to research by Google and London & Partners, the mayor's official promotional company for the city, the Science Museum was the most googled museum on the planet during summer 2015.

OUR GENEROUS SUPPORTERS

We extend our grateful thanks to all those individuals, families and organisations that have chosen to support the work of the Science Museum Group

SCIENCE MUSEUM	
Corporate supporters Accenture Airbus Group ARM Bayer plc BG Group plc Bionic Yarn Bloomberg Philanthropies BP BT Citadel Danone ghd GlaxoSmithKline Google Grant Thornton The Institution of Engineering and Technology King MathWorks ReAgent Samsung Shell Siemens plc Smiths Group plc Statoil URENCO Virgin Media Winton Capital Management Wire Broadcast Ltd	Lord Rees of Ludlow Sir Martin Smith and Lady Smith OBE
Individuals Bridget and David Jacob Dr Sara Levene Hans K Rausing Simon and Kate Reid Dr Martin Schoernig Mr and Mrs Michael G Wilson All those who wish to remain anonymous	Newton Circle Lord Archer and Dame Mary Archer Bridget and David Jacob Mr and Mrs Michael G Wilson
Trusts, foundations and government Arts and Humanities Research Council Biotechnology and Biological Sciences Research Council The Charles Hayward Foundation Dana and Albert R Broccoli Foundation The de Laszlo Foundation Department for Business, Innovation & Skills Friends of the National Libraries Heritage Lottery Fund Horizon 2020 European Union Funding for Research & Innovation The Ironmongers' Company The Keniston-Cooper Charitable Trust The Leathersellers' Company Charitable Fund The Leverhulme Trust Lloyd's Register Foundation The Lord Leonard Wolfson and Lady Estelle Wolfson Foundation Parasol Foundation Trust Players of People's Postcode Lottery Royal Academy of Engineering Royal Commission for the Exhibition of 1851 The Vandervell Foundation Wellcome Trust The Wolfson Foundation	Galileo Circle Lord Borwick of Hawkshead Dr Ann Coxon The de Laszlo Foundation Andreas J Goss Christopher and Judy Hurrien Steve Mobbs and Pauline Thomas Pi Capital Lawrence and Alice Staden
	Einstein Circle Sir John and Lady Chisholm Mr Andrew Eland and Dr Pascale Hazel Mr and Mrs Simon Godwin Hipolit and Hieronim Hodges Andrew Jackson Dr Kartar Lalvani OBE Dr Sara Levene Renato Lulia Jacob Paul Murray Sean Phelan and Audrey Mandela Clive Richards OBE
	Brunel Circle Toby Anstruther Mr Ian Blatchford Iain Bratchie David and Patricia Buck Mr and Mrs Mark Chapman Steve Clarke Dr John L Collins John and Elaine Elkington Mr and Mrs Andrew Griffith GRoW Annenberg Foundation Fiona Kumar Bhardwaj George and Angela Loudon Alan and Virginia Lovell Andrew and Joanne McGowan Lesley and Arthur I Miller Alexandra Papadakis Guy Reid Dr Neil Reid Marcin Jerzy Roth Mr and Mrs R A Saldanha Dr Martin Schoernig Ian and Helen Simm Chris Swinson OBE Mr David A Trapnell Nigel Wilkins Paul and Justine Williams Dame Fiona Woolf
NATIONAL RAILWAY MUSEUM	
Corporate supporters Abellio Group Alstom Transport UK Ambersphere Angel Trains Ltd Arriva UK Trains Ltd Arup Group Ltd Atkins plc Atlantic Container Line Bachmann Industries Europe plc Bombardier Transportation UK Ltd Central Japan Railway Company Colas Rail	Craftmaster Paints Dellner Ltd ESG Eurostar International Limited Eversholt Rail Ltd Ffestiniog & Welsh Highland Railways First TransPennine Express Friends of the National Railway Museum GB Railfreight Ltd Grand Central Railway Company Ltd Great Western Railway Hornby plc John McAslan + Partners Knorr-Bremse Rail Systems UK Linbrooke Services McKinsey & Company Mechan Ltd Mott MacDonald Network Rail LNE&EM Route Northern Rail Omnicom Engineering Ltd Porterbrook Pulsar Light Rail Media Group REPTA Ricardo Rail Ryder Architecture Science City York Shepherd Group Siemens Transportation Systems Ltd Thales UK Virgin Trains Wabtec Rail Ltd West Coast Railways West Japan Railway Company
	Individuals B Holdsworth Nigel Holland Dorothy Manfield Elizabeth Manfield Miss Lorna G Newman Oliver-Jones family Mr Peter Shears All those who wish to remain anonymous
	Trusts, foundations and government The Sylvia and Colin Shepherd Charitable Trust West Yorkshire Combined Authority
	Legacies Roger Emerson Mr Christopher J King Kenneth W Lovett Margaret Cecilia Scott
	Patrons
	Mallard Circle Michael Harry Sacher Charitable Trust Tom and Marie Spence (USA)
	Scotsman Circle Dr Ian M Holland Ian Macbeth Mr Harry Medcalf Neil Millington William N Smith Francis Townend
	Duchess Circle Derek Arrand Cryptair Ltd M R Darbyshire Mr D A Fagan Keith John Kellett Tom Kolisch

Alan E Moore CBE
Wick Moorman
Raymond Price
Richard Robertson
Andrew Scott CBE
Phil and Caroline Swallow
Joe Tonks
Mrs Sandra Turnbull
John Woodhouse

Rocket Circle
William R Adam
David and Patricia Buck
Ian Clatworthy
Frank Clough
John F Dixon
Connor Egan
C H Emeleus
The Flour Mill
Edward Arthur Gale
Mr Rod Giddins
Richard Harper
Dick Lane
Derek Langslow CBE
Stephen Middleton
Peter J C Mosse FRSA
David J P Nevell
Ian Robinson
Chris Taylor
Nigel Wall
Dean Welbourn
Rodney Wilson

MUSEUM OF SCIENCE AND INDUSTRY

Corporate supporters
Civil Engineering Contractors Association North West
Electricity North West Ltd
Haydale Limited
Manchester Science Partnerships
North West Business Leadership Team
Renold plc
Siemens plc
United Utilities
University of Salford
Waters Corporation

Trusts, foundations and government
Alzheimer's Research UK
Department for Business, Innovation & Skills
Department for Culture, Media & Sport
Engineering and Physical Sciences Research Council
Friends of the Museum of Science and Industry in Manchester
Players of People's Postcode Lottery
Wellcome Trust
The Zochonis Charitable Trust
All those who wish to remain anonymous

SUPPORTING THE SCIENCE MUSEUM GROUP

The financial support of our visitors and partners provides critical funding for the museums' core priorities and future plans. We are grateful to all those who have kindly made a donation to support the work of the Science Museum Group.

There are a number of different ways to become a supporter:

NATIONAL MEDIA MUSEUM

Corporate supporters
British Kinematograph Sound and Television Society
Laser Hotline
Media Servicing Limited
Virgin Media

Individuals
Tom March, Cinerama aficionado

Trusts, foundations and government
Arts Council England
British Film Institute
City of Bradford Metropolitan District Council
Department for Business, Innovation & Skills
Department for Culture, Media & Sport
Japan Foundation London
The Morrisons Foundation
All those who wish to remain anonymous

SCIENCE MUSEUM FOUNDATION

The Science Museum Foundation was set up in 2012 to support the fundraising efforts of the group. We are grateful to the following for their continued involvement and support:

Donors
Lord Borwick of Hawkshead
Mr and Mrs Donald Brydon
The David and Claudia Harding Foundation
Edwina Dunn
Lord Rees of Ludlow
Sir Martin Smith and Lady Smith OBE
Mr and Mrs Michael G Wilson

Trustees
Mr Adrian Beecroft
Lord Borwick of Hawkshead
Mr Donald Brydon CBE
Professor Richard Clegg
Mr Howard Covington
Mr Bob Cowell
Ms Edwina Dunn
Mr Michael Hoffman
Lord Rees of Ludlow
Sir Martin Smith
Mr Michael G Wilson OBE



The Science Museum director's annual dinner where we thank our supporters

Individual philanthropists play a unique role as transformational donors and enjoy special access to bring them closer to our museums, collections and programmes.

Corporate supporters partner with us across a range of activities including gallery and exhibition sponsorships.

Patrons support the work of the museums through their annual donations and enjoy special access to our museums, collections and programmes.

Trusts, foundations and lottery bodies provide essential and substantial support for our new gallery developments, exhibitions, learning programmes and wider public engagement.

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**

THE BIGGEST MUSEUM ALLIANCE IN SCIENCE



SMG chairman Dame Mary Archer presenting Science Museum fellowships to businessman and donor David Harding and to American-British Nobel laureate neuroscientist Professor John O'Keefe

SCIENCE MUSEUM GROUP OBJECTIVES

The Science Museum Group (SMG) is devoted to the history and contemporary practice of science, medicine, technology, industry and media throughout which the common bond is human ingenuity. Our collections form an enduring record of scientific, technological and medical change since the 18th century. SMG incorporates the Science Museum, its library and archive and the Wellcome Collection of the History of Medicine in South Kensington; the National Railway Museum in York and Shildon; the Museum of Science and Industry in Manchester; and the National Media Museum in Bradford. Our two major collections stores are located at Wroughton in Wiltshire and Blythe House in West Kensington.

Our strategic objectives across SMG are to aspire to the highest international museum standards in the care and preservation of collections, scholarship, programming, learning and advocacy for our subject areas; strengthen our core narratives and deliver dynamic gallery displays; implement clear audience strategies that focus on providing life-enhancing experiences; extend our reach nationally and internationally; be an organisation that is extrovert, entrepreneurial, efficient and dedicated to the development of great people.

THE CHARITY

The Board of Trustees of the Science Museum was established under the National Heritage Act 1983. SMG is an exempt charity under the Second Schedule of the Charities Act 1994.

The Science Museum Group comprises:

Science Museum, London
National Railway Museum, York and Shildon
Museum of Science and Industry, Manchester
National Media Museum, Bradford
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 are responsible to

the prime minister through DCMS. The director of SMG, as chief executive officer, is responsible to the Board of Trustees, and as accounting officer is accountable to DCMS for compliance with the Management Statement and Financial Memorandum.

All those named in this page held office during the year under review, 2015–16

Chairman

Dame Mary Archer DBE

Members

Mr Howard Covington, until April 2016
Mr Matthew d'Ancona
Professor Dame Athene Donald DBE
Rt Hon. Lord Faulkner of Worcester
Miss Sharon Flood
Professor Russell G Foster CBE
Mr Andreas J Goss
Lord Grade of Yarmouth CBE
Professor Ludmilla Jordanova
Mr Simon Linnett
Professor Averil Macdonald OBE
Professor David A Phoenix OBE
Dr Gill Samuels CBE (Trustee), until August 2015
Mr Anton Valk CBE
Rt Hon. Lord Willetts
Dame Fiona Woolf CBE

OUR DISTINGUISHED ADVISERS

Science Museum Advisory Board

Chairman: Mr Howard Covington (Trustee), until April 2016
Rt Hon. Lord Willetts (Trustee), from April 2016

Mr Matthew d'Ancona (Trustee), from April 2015
Ms Jane Atkinson
Dr Sarah Caddick
Professor Dame Athene Donald DBE (Trustee)
Dr Marcus du Sautoy
Mr Malcolm Garrett
Dr Lucie Green
Sir Tim Hunt, until February 2016
Sir Paul Nurse, from March 2016
Professor Michael J Reiss
Dr Gill Samuels CBE (Trustee), until August 2015
Professor Simon J Schaffer

Professor Molly Stevens
Professor Helen Storey MBE

National Railway Museum Advisory Board

Chairman: Mr Simon Linnett (Trustee)

Mr Philip Benham
Mr David Brown, from January 2016
Rt Hon. Lord Faulkner of Worcester (Trustee and observer)
Mr Bryan Gray CBE
Professor Ludmilla Jordanova (Trustee)
Dr Ellen McAdam, from September 2015
Professor Clive Roberts, from June 2015
Dr Gill Samuels CBE (Trustee), until August 2015
Mr Adrian Shooter CBE
Ms Sarah Tanburn, until June 2015
Mr Anton Valk CBE (Trustee)
Mr Christian Wolmar

Museum of Science and Industry Advisory Board

Chairman: Dr Gill Samuels CBE (Trustee), until August 2015
Professor Russell G Foster CBE (Trustee), from September 2015

Professor Colin Bailey
Dr Maria Balshaw
Mr Michael Emmerich
Rt Hon. Lord Faulkner of Worcester (Trustee and observer)
Clare Hudson, from April 2015
Mr Steve Johnson
Sir Richard Leese CBE
Professor Andy Miah, from March 2016
Rt Hon. Baroness Morris, from December 2015
Dr Erinma Ochu
Professor David A Phoenix CBE (Trustee), from April 2015

National Media Museum Advisory Board

Chairman: Lord Grade of Yarmouth CBE (Trustee)

Ms Samira Ahmed, from May 2015
Ms Yvonne Baker, from May 2015
Mr Pierre Brahm, until May 2015
Professor Brian Cantor
Baroness Margaret Eaton DBE, from May 2015
Professor Elizabeth Edwards, from May 2015
Ms Kersten England, from September 2015
Professor Russell G Foster CBE (Trustee)
Mr Philippe Garner
Ms Suzan Hemingway, until June 2015
Mrs Sally Joynson, from May 2015
Mr Matt Locke, until May 2015
Professor Averil Macdonald (Trustee), until April 2015
Baroness Manzoor, until September 2015
Dr Annette Nabavi
Ms Carolyn Reynolds, until December 2015
Ms Gillian Reynolds MBE
Dr Gill Samuels CBE (Trustee and observer), until August 2015

NEW FELLOWS OF THE SCIENCE MUSEUM

David Harding: in appreciation of his distinguished contribution to the advancement of science education, research and philanthropy.
Professor John O'Keefe: in appreciation of his distinguished contribution to the advancement of world science through research and advocacy.
Alexei Arkhipovich Leonov: in appreciation of his distinguished contribution to the advancement of human space exploration.

SCIENCE MUSEUM, LONDON



Star exhibit: Handley Page HP39 Gugnunc aeroplane (1929), which will hang as a centrepiece in the new Mathematics gallery

Director: Ian Blatchford

Science Museum

Exhibition Road

London SW7 2DD

www.sciencemuseum.org.uk

OBJECTIVES

As the home of human ingenuity the Science Museum has a mission to make sense of the science that shapes our lives. This commitment drives everything we do. Through our world-class collections of original historic objects, galleries, interactive experiences and our learning programmes we aim to be the leading international museum championing the understanding, enjoyment and prestige of science in modern society. To help create a scientifically literate society and inspire the next generation, our Strategic Ambitions focus on four core themes: climate science and sustainability, medicine, informatics and the science of data, and understanding the universe. This ten-year strategy, implemented in 2012, includes a commitment to focus on the urgent choices faced by society and the fundamental science and technology that underpin them.

AUDIENCES

The museum attracts about 3.4 million visits a year, half in family groups and 1 in 13 in education groups, typically 450,000 per year (more than 40% BAME). Our recent blockbuster exhibitions have attracted independent adult visitors in growing numbers. The Science Museum is a must-see London destination, with a third of general admissions from overseas. We are the most googled museum in the world, with 40% of our website traffic coming from abroad.

HIGHLIGHTS

The Science Museum traces its origins from the Great Exhibition of 1851 when its world-class collections of original artefacts began amassing to represent the history of science, technology, engineering and medicine. Among our key exhibits 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 archive collections include rare and significant items such as the first Latin translation of Ptolemy's

Almagest, letters written by Sir Humphry Davy and Charles Babbage's drawings for his calculating engines.

The museum has pioneered interactive science interpretation for more than 80 years and the new Dana Research Centre and Library reinforces our research ambitions, while the *Antenna* and *Who Am I?* galleries are flagships for cutting-edge science. Such distinguished figures as Nobel laureates, ministers and Oscar winners appear in museum events that include monthly adults only Lates evenings and in our IMAX auditorium enhanced to host live productions, as well as 3D and 70 mm films.

FUTURE AMBITIONS

This year: impressive new temporary exhibitions about robots, big data and the medical innovations of the First World War, plus the opening of two important new galleries, *Mathematics: The David and Claudia Harding Gallery*, designed by Zaha Hadid Architects, and our exciting new interactive gallery for the young. Our Masterplan continues to transform the museum, and will repurpose one-third of our floor space.

NATIONAL RAILWAY MUSEUM, YORK AND SHILDON



Star exhibit: *Rocket* replica, photographed in 1996 at a cavalcade that formed part of NRM's 21st anniversary celebrations

Director: Paul Kirkman
National Railway Museum
Leeman Road
York YO26 4XJ
www.nrm.org.uk

OBJECTIVES

The National Railway Museum's vision is to be the prime showcase in the world for the huge impact railways and their technology have had in the past and will have in the future on people, the economy, society and the environment in Britain and the wider world. We focus on appealing boldly to non-specialist audiences, showcasing the modern railway industry, creating new public spaces and galleries and responding to developments in the museum's surroundings.

The NRM comprises a main museum in York housed in inspiring historic buildings and a second museum in Shildon, County Durham. The NRM in Shildon is operated in partnership with Durham County Council and houses some of the National Collection in a new building. A charismatic 19th-century site also features the former workshop of Timothy Hackworth, built for the world's

first passenger railway of 1825. Shildon is known as the 'cradle of the railways'.

AUDIENCES

Our museum in York appeals successfully to family groups, who make up about half of our visitors. More than two-thirds of our audience are non-enthusiasts, including our growth audience of adult nostalgia-seekers. A large proportion of visitors come from outside the Yorkshire and Humber region, many from overseas.

HIGHLIGHTS

The NRM is a world authority on railway history and preservation, and holds the world's largest collection of 70,000 railway artefacts from 300 years of railway history. Locomotives and other rail vehicles in the collection include *Sans Pareil*, a competitor in the 1829 Rainhill Trials won by *Rocket*; the famous *Flying Scotsman*; the elegantly streamlined world steam speed record-holder *Mallard*; the only Japanese bullet train outside Japan; a giant Chinese steam locomotive; and a world-class collection of royal trains, among them Queen Adelaide's saloon (the oldest preserved railway carriage in Europe). Other

items include coins and medals, railway uniforms and costumes, equipment, documents, records, artwork, photographs and even a lock of Robert Stephenson's hair. Twenty-seven of the locomotives in the collection are in full working order, maintained by an army of eager volunteers and apprentices at both York and Shildon.

FUTURE AMBITIONS

The museum's highly anticipated *Scotsman* season illustrates the history of the locomotive and train service. An exhibition at our York site will tell the forgotten story of First World War ambulance trains, which transported the sick and injured to hospitals across Europe.

We continue our award-winning partnership with York Theatre Royal with a theatrical interpretation of our *Ambulance Trains* exhibition. Other collaborations include working alongside the rail industry and budding young engineers as part of our new Future Engineers event. Our Masterplan focuses on the Great Hall and opportunities presented by the development of York Central.

MUSEUM OF SCIENCE AND INDUSTRY, MANCHESTER



Star exhibit: Replica of the Baby or SSEM computer, the world's first stored-program computer, which ran its first program in 1948

Director: Sally MacDonald
Museum of Science and Industry
Liverpool Road, Castlefield
Manchester M3 4FP
www.mosi.org.uk

OBJECTIVES

The Museum of Science and Industry is Manchester's most visited museum. We aim to inspire visitors through ideas that change the world, from the Industrial Revolution to today and beyond. We pride ourselves on being uniquely placed to tell this story through our historic location on the site of the oldest surviving passenger railway station, right in the heart of a city steeped in scientific discovery and innovation. We combine this landmark feature with our vibrant, year-round contemporary science programme created to inspire, surprise and enlighten our audiences of all ages.

AUDIENCES

Families continue to be our largest group of visitors, while almost 1 in 10 visits are made in educational groups. Our aim is to inspire the next generation of scientists, engineers, designers, chemists and entrepreneurs. We are

also committed to growing our audience of independent adults.

HIGHLIGHTS

We care for a globally important heritage site comprising five listed buildings, two of them listed Grade 1. This site was the original terminus of the world's first inter-city railway and our characteristic 1830 Warehouse epitomises Manchester's 19th-century reputation as 'the warehouse of the western world'.

Key objects in the collection include the models used by John Dalton to demonstrate his atomic theory, laying the foundations of modern chemistry; parts from the world's first commercially available computer, the Ferranti Mark I; and one of the world's largest collections of working steam mill engines, which visitors can see in action in the *Power Hall*. There are also daily demonstrations from spinning to weaving on original machines in the museum's *Textiles* gallery.

One of the flagship events in our cultural calendar, enlivening science for people of all ages, is the 11-day multi-venue

Manchester Science Festival. Each October half term it attracts the best scientists from Manchester and beyond to showcase current research and promote the region's rich heritage of innovation.

FUTURE AMBITIONS

We aim to remain an essential and distinctive cultural venue in the heart of the city and a significant centre for science discovery and learning. To this end, we have created a long-term Masterplan which includes the creation of our new special exhibition gallery opening in 2018. This ambitious project will transform the vaults of our historic viaduct and 1830 Warehouse into a venue for world-class contemporary science exhibitions located in the most significant part of our site – the 1830 complex.

This transformation will also enable us to continue our relationship with major STEM-focused organisations, such as the Wellcome Trust and Siemens plc, to help build and further develop our reputation and the city's as a globally significant place for science innovation and understanding.

NATIONAL MEDIA MUSEUM, BRADFORD



Star exhibit: The Kodak No. 1 camera (1889) used roll film and produced photographs such as this, *Woman in a Rowing Boat*, about 1890.



Director: Jo Quinton-Tulloch
National Media Museum
Pictureville
Bradford BD1 1NQ
www.nationalmediamuseum.org.uk

OBJECTIVES

At the National Media Museum we explore the science and culture of image and sound technologies, and their impact on our lives. The museum's specialism in image and sound technologies draws in particular on its unrivalled collections in the development of photography, film and television. Our objective is to become a dynamic and inclusive museum, internationally recognised for its world-class collections and for using them in meaningful and inspiring ways.

AUDIENCES

The largest single section of our audience comes as part of a family group and continues to grow. The museum is an important attraction and resource for communities in Yorkshire – especially Bradford District and Leeds – and the majority of visitors come from the region. Almost a fifth of our 460,000 visitors come to watch a film in one of our

cinemas and about 9% are from BAME backgrounds. Increasing numbers of visitors have been attracted by the vastly improved IMAX cinema which is attracting a younger audience to the museum and helping to drive income.

HIGHLIGHTS

The National Media Museum is situated in the heart of Bradford, UNESCO City of Film. Traditional and interactive galleries located across seven floors investigate and celebrate the technologies that sit behind film, photography, television, animation and new media.

The museum is home to more than 3 million items of historical 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; Kodak No. 1, the American-made camera that enabled mass photography from 1889; and John Logie Baird's apparatus used to produce the first true television pictures in Soho in 1925. We also house the *Daily Herald* archive, a vast collection

of photographs from 1911 to the mid-1960s – a fascinating record of local and international events.

Europe's first IMAX theatre opened right here in the museum in 1983, and we house two other cinemas which can display the widest range of film formats. The Pictureville cinema boasts the only permanent, regularly programmed Cinerama installation in Europe, a magnet for enthusiasts worldwide.

FUTURE AMBITIONS

The next phase of development will be a major £1.8 million interactive gallery, expected to open in March 2017. This is being designed in partnership with leading agency Ab Rogers Design and will be the museum's first new gallery in more than five years. Then the *Treasures* galleries will provide a worthy showcase for the extraordinary and earliest examples of technology in our collection. They will also draw on the wider SMG collection to broaden that story to cover sound, as well as other light-based technologies. Together, these new permanent galleries will give the museum a new lease of life.

SCIENCE MUSEUM GROUP STORE, WROUGHTON

The Science Museum Group's collection contains a superb range of large objects available for both exhibitions and research. Huge artefacts are stored at and brought out for display from a site of equally impressive scale, a 545-acre former airfield at Wroughton in Wiltshire.

This year one of the largest objects conserved at Wroughton has been the Gugnunc biplane that will feature in the new *Mathematics* gallery. The plane was moved into a specially created dehumidification tent to dry out moisture inside it, ensuring that there will be no sudden changes that could damage its fragile surfaces once installed in the Science Museum.

The group's new strategy for collection services [see page 44] designates Wroughton as a national hub that enables the collection to be accessed and used across and beyond the museums.

Following the chancellor's spending review in December and the announcement of strategic government investment in storage, Wroughton will be further developed to rehouse objects



At Wroughton: Simulated image highlights the scale of the solar park

currently located at Blythe House in London as well as replacing some existing facilities.

The year also saw the construction of a solar park in the centre of the airfield by British Solar Renewables. When

energised, it will put four times as much electricity into the National Grid as we use as a group, while providing a reliable income stream. We are also looking at the potential to raise further income through Wroughton by providing storage to other museums there.

BLYTHE HOUSE COLLECTIONS STORE, LONDON



At Blythe: Conservation intern Louise Stewart working on an object for display in the *Wounded* exhibition

Behind the preparations for the Science Museum's forthcoming major galleries on mathematics and medicine lies Blythe House, the group's small-object store at Olympia in London. Here, curators select artefacts for display, photographers digitise them and conservators prepare them.

Highlights of the past year for the busy team of conservators included the meticulous cleaning of 300 pieces of an Automaton Lathe that will be reassembled for a future exhibition on robots, alongside thousands of objects decanted from the former medicine galleries at the Science Museum.

The group currently shares a third of Blythe House with the V&A and the British Museum. It is, however, an ageing facility that is not a sustainable long-term

solution for the storage of our collection, and offering only very limited access for researchers.

Following the chancellor's announcement of £150 million for the three museums to relocate storage from Blythe House to facilities fit for the 21st century, plans are being drawn up to move about 320,000 of our objects. As well as carefully packing the many fragile artefacts, the need to handle every one provides an efficient opportunity to digitise the collection.

Nobody is pretending that photographing and moving objects on this scale will be anything other than a giant undertaking, but the outcome – enabling greater access to the collection online and for researchers – will be a boon for the public, our collections and SMG.

WHAT WE LENT OUT

In 2015–16 the Science Museum Group loaned 2745 objects to 159 different venues in the UK and 154 objects to another 31 overseas. Here's where ten ended up

Sources:
SM – Science Museum, London
NRM – National Railway Museum, York and Shildon
MSI – Museum of Science and Industry, Manchester
NMeM – National Media Museum, Bradford



To: Fundación Mapfre, Madrid, Spain and George Eastman House, Rochester, USA
Fantasia (1957), by Alvin Langdon Coburn, photographic print loaned to the exhibition *Alvin Langdon Coburn*. Coburn was a key figure at the beginning of the avant-garde photography movement and one of the most important photographers of the first half of the 20th century.
Source: NMeM



To: Chhatrapati Shivaji Maharaj Vastu Sangrahalaya (CSMVS), Mumbai, India
Polychrome devil mask (1770–1920), representing a red-faced devil wearing a headdress adorned with cobras, used in Kolam, a type of folk drama performed in Sri Lanka. Loaned to *Medicine and Healing in India*.
Source: SM



To: JCI Camera Museum, Tokyo, Japan
Talbot mousetrap camera (c. 1835), an example of the experimental devices William Henry Fox Talbot used in developing photography, loaned to *The History of the British Camera*.
Source: NMeM



To: The Louvre, Paris, France
Coalbrookdale by Night (1801), oil painting by Philippe Jacques de Loutherbourg. This archetypal image of the Industrial Revolution depicting flames from open coke hearths was loaned to *A Brief History of the Future*.
Source: SM



To: National Football Museum, Manchester, UK
Model 14T3 black-and-white television (1952), by Ferranti Ltd, on long-term loan since 2012. This model was launched at a time when television sets were becoming much more popular in Britain, in the run-up to the Queen's coronation.
Source: MSI



To: Ironbridge Gorge Museum Trust, Telford, UK
Making Embankment, Bugbrooke (1837), a wash drawing by John Cooke Bourne from a collection of views on the construction of the London & Birmingham Railway. Loaned to *To Check the Tide of Prejudice: John Cooke Bourne and the London & Birmingham Railway*.
Source: NRM



To: Royal College of Physicians, London, UK
John Dee's crystal (1582), maker unknown. Used for clairvoyance and to treat disease. Loaned to *Scholar, Courtier, Magician: The Lost Library of John Dee*.
Source: SM



To: STEAM – Museum of the Great Western Railway, Swindon, UK
No. 3440 City of Truro, a 4-4-0 steam locomotive designed by William Dean and built by the Great Western Railway at Swindon, 1903. A new addition to our long-term loan of 1000 objects to this museum.
Source: NRM



To: Arlington Court and the National Trust Carriage Museum, Barnstaple, UK
Early Punch carriage (date unknown). An unusual design believed to have been built for a country doctor. Part of a long-term loan of 17 objects.
Source: SM



To: National Maritime Museum, London, UK
Morland's calculating machine (1666), with stylus and leather case, made by Humphrey Adamson and engraved 'Samuel Morland, Inventor, 1666'. Loaned to *Samuel Pepys: Plague, Fire, Revolution*.
Source: SM

WHAT WE COLLECTED AND WHY

Hadrian Ellory-van Dekker, Science Museum head of collections and chief curator, explains

What to acquire? Or, what not to acquire? This remains a continual dilemma for curators – particularly at a time when the future sustainability of growing public collections is a necessary topic for discussion and action. However, the Science Museum Group remains committed to building a world-leading collection that captures the landmarks of Britain's industrial and scientific past and the infinite challenges of the present.

Across the group, we believe passionately in the unique power of objects to connect with history's turning points, such as this key 19th-century map of the night sky (*right*). A major strength is reflecting breakthroughs, with acquisitions this year including the UK's first HIV self-testing kit. Our collection is set in an international context through items such as photographs

Shadow Biped robot (1987–97) *right*
Designed by David Buckley and made by the Shadow Robotics Project Group, London. Intended as a project to attract members to the group, it was one of the first biped robots built outside Japan. Acquired for the 2017 *Robots* exhibition.

Uranographia, sive astrorum descriptio* (1801) *far right
First edition of one of the most important illustrated celestial atlases showing stars visible to the unaided eye, mapped by the German director of the Berlin Observatory, Johann Elert Bode, who also named the planet Uranus.

demonstrating the social impact of cinema in South Africa in the 1920s. And a humble quilt celebrating a romantic engagement in Manchester in the 19th century shows that new technologies did not immediately displace traditional manufacturing. Here is a small selection of the objects chosen this year that epitomise our endeavours.



Caddow quilt (1886)

A hand-woven decorative cotton quilt, made to commemorate the engagement or wedding of John and Mary Lomax. The recipients came from a family of weavers and the quilt shows that the use of traditional hand-weaving continued even after mechanisation.



Pixelvision video camera (1988)

Developed by toy company Fisher Price, the PXL-2000 black-and-white camcorder gained popularity with amateur and underground film-makers in the 1990s. The grainy, low-resolution, trailing images give a dream-like quality which has become something of a cult.



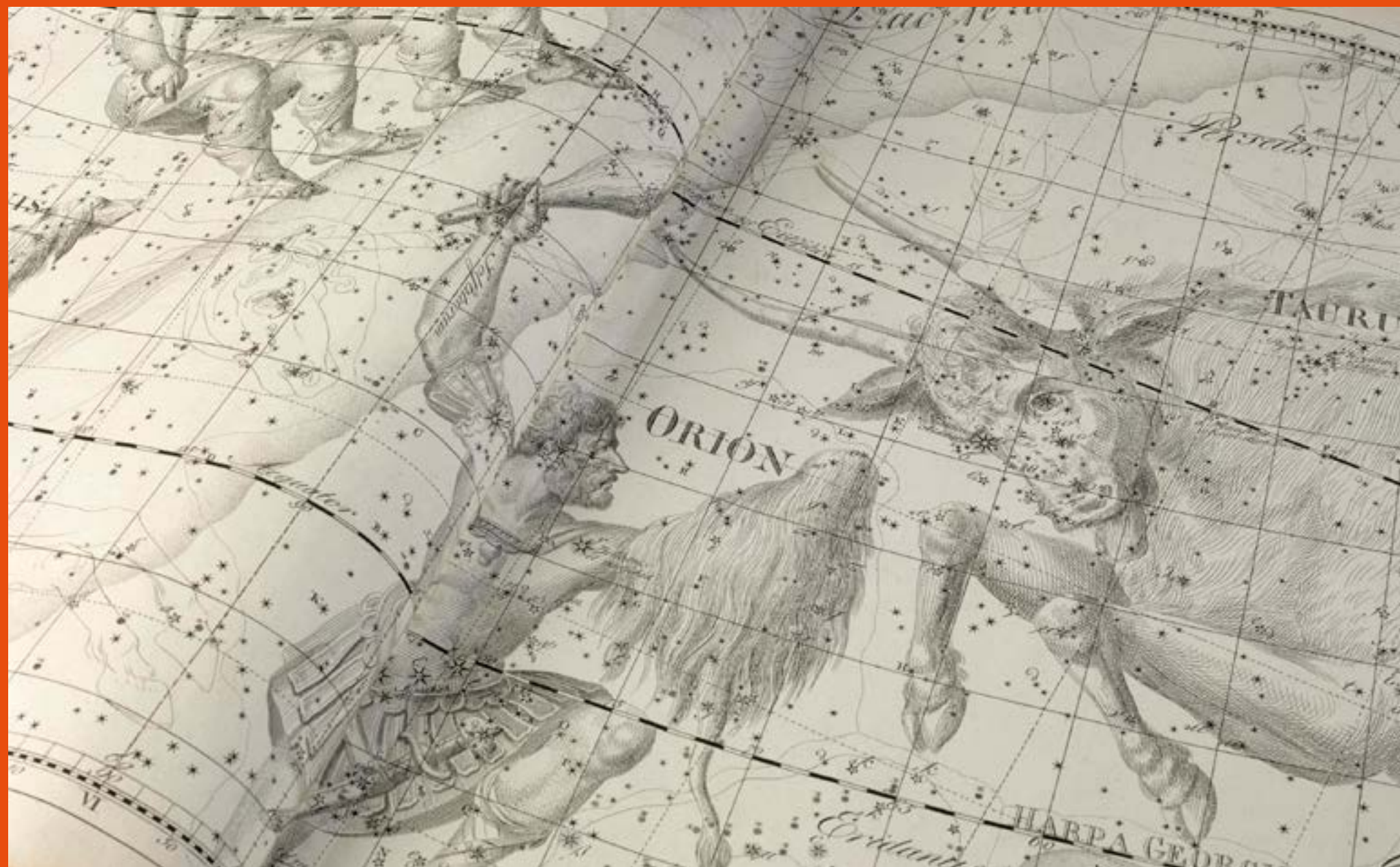
Soviet Railways leaflets and handbills (1963)

Collected by British Railways employee James Collin when he visited Moscow in 1964. The imagery and style make an interesting contrast with the launch of British Rail's new corporate identity in 1965.



BioSure HIV self-testing kit (2015)

Manufactured by BioSure, Nazeing, Essex. The first over-the-counter self-testing kit to go on sale in the UK following the controversial legalisation of self-testing in 2014.



A RAILWAY COLOSSUS IS REBORN

This year marked the long-awaited return of the legendary steam locomotive *Flying Scotsman* to the tracks after a decade-long restoration project. The 1923 locomotive, the sole survivor of the A3 class designed by Sir Nigel Gresley, roared up the east coast main line to its York home in February. As the UK's oldest main-line working locomotive, *Scotsman* sported the British Railways green livery and the number 60103 it carried at retirement from regular service in 1963. Its eagerly anticipated inaugural run, a thank you to all those who made the restoration possible, kicked off the National Railway Museum's *Scotsman* season – a homage to this most famous of all steam engines, which was the first to record an authenticated speed of 100 mph in 1934.

Buying *Flying Scotsman* for the nation at a cost of £2.3 million turned out to be the easy part. A restoration expected to last 18 months when it began in 2006 turned out to require replacement of nearly every vital part, including the boiler, all built to original specifications. 'Anything else', said engineering manager Simon Holroyd, 'just wouldn't be *Flying Scotsman*. You would have lost its heritage.'

The most complicated engineering jigsaw puzzle of recent times finally reached completion in the Bury workshop of Riley & Son (E) Ltd. The last lap of this complex project included the boiler being craned onto the icon's frames in August. Next, the modern equipment that is needed for running on Britain's main-line tracks was fitted by electrical engineer Mandy Sharpe.

In the final weeks of 2015 the fire was lit for the first time and *Scotsman* roared back to life. News crews have followed its every move since.

National Railway Museum head curator Andrew McLean summed up the steam giant's appeal. 'You can't fly on Concorde now. You can't cross the Atlantic on the original *Queen Mary*. But you will be able to travel on a train hauled by *Flying Scotsman*.'

[VIEW THIS](#)
flyingscotsman.org.uk

“ You get the sight, the sound, the smell, the heat – a spectacle touching all your senses. When it is running like that, a steam locomotive is alive

ANDREW MCLEAN NRM HEAD CURATOR



Renovation of *Flying Scotsman* in the Bury workshop of Riley & Son...



brought into the age of technology by electrical engineer Mandy Sharpe...



and crewed on the east coast main line by professionals who were loving it