1. Executive summary

1.1 The five Museums of the Science Museum Group (SMG) are a key national resource. With our unparalleled collections in the fields of science, technology, engineering, mathematics and medicine, we are uniquely placed to draw people of all ages to engage with science in an inspirational and informal way.

1.2 With over 600,000 of the Group’s nearly 6 million visitors each year coming in education groups, we have an extraordinary capacity to contribute to closing the UK STEM skills gap by inspiring future generations to see that science is for them. It is this fundamental shift in attitude and aspiration that we believe is crucial to make a sustained difference, and something that our science museums which from part of the informal science learning sector, are so well placed to deliver. We do this at our best as part of what we describe as a STEM learning ecosystem, that has many other crucial and complimentary parts.

1.3 Our organising principle is to build ‘science capital’ to enrich people’s lives and enhance their contributions to society. Science capital offers us a lens for understanding what influences our visitors’ attitudes towards science, and the reasons for the differences in their engagement with science. It shows us the reasons why some people do or don’t take part in science related activity.

1.4 If we can provide experiences that help more people make deeper connections with science by accessing the ‘capital’ they already have, we can help to change people's attitudes towards science in the long term. This will lead them to value it and to use it to improve and enrich their lives, and for more young people to consider a STEM related career. Therefore, the Science Museum Group has recently placed ‘to grow science capital in individuals and society’ as its core no.1 priority in its forthcoming 2017-2030 Strategy.

2. Background

2.1 The Science Museum Group is a UK-wide organisation. We hold the world’s most important collection of scientific and engineering objects in four national museums: the Science Museum in London; the Museum of Science & Industry (MSI) in Manchester; the National Railway Museum (NRM) in York and in Shildon; the National Media Museum (NMeM) in Bradford; and storage sites in London and Wiltshire. With more than 5.5 million visits to SMG museums per year (around 40% outside London), our museums connect with diverse audiences, whose needs and expectations we understand. Millions more people experience SMG online and the Science Museum is, on average, the most Googled museum on the planet.

2.2 SMG is also an international organisation. Our curatorial teams are working from Moscow to India to Sierra Leone, and our education teams have recently visited countries such as China, South Korea, Brazil and Turkey. 600,000 people have seen our ground-breaking exhibition about the Large Hadron Collider, Collider: Step inside the world’s greatest experiment, in the UK, Paris, Hong Kong and Singapore and Australia. 230,000 online users from 199 countries participated in MSI’s citizen science project, #HookedOnMusic, which is contributing to research into Alzheimer’s disease. We regularly lend artefacts from our collections overseas, collaborate on research and professional practiced. We work with organisations such as the GREAT campaign to support tourism and promote UK science and technology.

2.3 SMG is an acknowledged leader in informal STEM education. We set up the pioneering Children’s Gallery in 1931. Anecdotally, we know we have played an important role in the formative years of...
scientists such as Stephen Hawking and James Lovelock. More than 600,000 visitors to our Museums come in booked education groups. The Science Museum is the most-visited of all UK museums for education groups, welcoming 458,000 such visitors in 2015/16. The scale and variety of our activity is described in the document, *Inspiring the Next Generation: a nationwide force for promoting STEM* (www.sciencemuseum.org.uk/stem; hard copy available). Our work is underpinned by leading academic research, working in partnership with Kings College London. As well as providing a rich and diverse offer directly to pupils, students and families through exhibitions, festivals, performance and other events, we run CPD programmes for over 500 of teachers per year. SMG also trains hundreds of scientists in public engagement each year, for our own programmes and those of other, such as the Royal Society.

3. Science Museum Group approach to STEM engagement

In 2016 we agreed a new Learning Strategy that builds upon our strengths and deepens our impact, efficiency and effectiveness. It is founded on a set of Learning principles:

- *We ignite curiosity in science.* We do not teach or lecture our audiences about science, but seek to inform and inspire.
- We use the principles of Science Capital to shape our learning programmes, live events and inform our interpretation for exhibitions.
- We play our part in an ecosystem of STEM learning where we support and encourage our audiences to extend their learning within and beyond our Museums. This ecosystem encompasses a broad range of organisations, programmes and activities, including schools, FE and HE sectors, national and local government, charities and private companies.

3.1 National Schools Programmes

605,000 people visited SMG’s museums in booked education groups in 2015/16. This includes 458,000 visits to the Science Museum, making it the most visited museum by booked education visitors in the UK. There were 73,000 booked education group visits to the Museum of Science and Industry, 30,000 to the National Media Museum and 37,000 to the National Railway Museum. In addition, 83,000 people attended Outreach sessions across the UK and internationally. School visitors represent our most diverse audience. For example, our schools groups visiting the Science Museum are 40% BAME. 18% of our education group visitors are in receipt of free school meals, compared to 16% in the national population.

3.2 Enterprising Science - research to practice

*Enterprising Science* is a five-year partnership (2013-2017) across the Science Museum Group and King’s College London, supported by BP. This research and development project uses the concept of science capital (science-related qualifications, interest, literacy and social contacts) to understand how young people from all backgrounds engage with science and how their engagement might be supported.

Research shows that the more science capital a young person has, the more likely they are to study science post-16 and to see science as ‘for me’. Yet national survey data shows that 27% of all 11 to 17 year olds have low science capital, particularly those from disadvantaged schools and communities. This limits their opportunities and outcomes in life, and contributes to the shortfall in young people in the UK choosing STEM subjects. Science capital can help us to understand what influences and shapes people’s attitudes towards science (whether they see science as for them or not).

Enterprising Science aims to engage more young people with science by:

- Increasing understanding about the factors that influence science engagement and participation
• Helping teachers to build students' science capital
• Developing new approaches for engaging students from all backgrounds with science, particularly focusing on those from disadvantaged schools and communities

Enterprising Science is a partnership of academics and practitioners working together to support schools and other professionals in engaging more young people with science. Our approach aims to highlight the relevance of science to young people’s futures and find ways to connect school science with students’ diverse identities and lives. It involves collaboration between schools, young people and their families, and museums and science centres.

The Science Museum Group is providing practitioner-based expertise about outside classroom, museum and science centre learning. We are exploring ways to develop and adapt a science capital approach for the informal science learning (ISL) sector through developing new tools and approaches to engage all our audiences with science. This will help us to reach out to new and diverse audiences.

3.3 STEM Ambassador Hub—Greater Manchester, North Yorkshire and West Yorkshire

Since October 2016 the Science Museum Group, through its Northern Museums in Manchester, Bradford and York, has been running the Trans-Pennine STEM Ambassador Hub. We are building upon the existing relationships that the Museum of Science and Industry in Manchester, the National Media Museum in Bradford and the National Railway Museum in York have to form a STEM learning ecosystem across the region. The Hub connects teachers, leaders of non-school groups, STEM Ambassadors and employers in order to inspire the next generation of STEM professionals. There are over 2000 active STEM ambassadors across these three regions which we will grow to 3000 by 2018.

Our STEM Ambassador Hub is one in a network of 19 Hubs that will manage the volunteering opportunities for the UK’s 33,000 registered STEM Ambassadors. The network is managed by the National STEM Learning Centre and Network, which works to enable more young people to enjoy, achieve and progress in STEM subjects and STEM related careers.

3.4 Building Bridges

The Science Museum Group is working with 21 schools from Reading and five partner boroughs in London on this three-year project to raise science literacy among 11- and 12-year-olds. We work with the young people, their teachers and families through school’s outreach, museum visits and family events to provide opportunities for students to reflect and discuss science at home to promote the relevance of science in their lives and communities.

Academic research led by Sheffield Hallam University and University College London has found strong evidence that this project is having a positive impact on students’ scientific literacy, their understanding of how science affects their lives and their interest in science careers. After taking part in Building Bridges, 62% of participants said that they would ‘like to find out more about careers in science’.

The project approach includes an outreach visit, a Science Museum visit, Teacher CPD and Family engagement. We provide students with activities to do at home with their families across the year. At the end of the year we invite participating project teachers and students, together with their families and friends, to the Museum for a huge party. Here families can see what the students have done and can take part in exciting activities.

3.5 Interactive Galleries

The Science Museum has recently opened Wonderlab, a new world class charged for hands on interactive gallery for 7-14 yr olds and their families. Inspired by the power of wondering, the gallery
Written evidence submitted by the Science Museum Group (GAP0072)

ignites curiosity in science and maths through more than 50 cutting edge exhibits and immersive experiences. Since opening in October 2016 the gallery has welcomed over 110,000 visitors.

The gallery enriches learning across the curriculum themes of forces, electricity, light, sound, matter, space and maths. The exhibits encourage visitors to be curious, to look at close details and to be creative – skills that are invaluable to scientists. Schools access is free and our objective is to welcome 200,000 school visitors per annum by 2018. This is double the number of school visitors to our previous interactive gallery.

3.6 Digital

Ensuring that we reach audiences beyond our walls to inspire them about science is also important and we have an impressive catalogue of successful online games including the multiple award winning LaunchBall and more recently the Rugged Rovers App². This encourages young people to design their own Mars Rover and compete against others and has been downloaded approximately 1 million times to date.

3.7 Teacher Training

The Science Museum has a long-term commitment to supporting teachers in their classroom practice and in making the best use of our museums. In 2015/16 we delivered teacher training to 516 teachers.

We also continue to run our popular Teacher Zone events during Lates (our spectacular adults-only evening once a month) events once a term, reaching 574 teachers. These events are designed to showcase the museum’s offer for schools, give teachers the chance to take part in activities, trial our resources and talk to our experienced Learning staff about how the museum can support their teaching.

3.8 Engineer Your Future Exhibition

In response to the specific issue that not enough people are choosing engineering as a career, the Engineer Your Future exhibition at the Science Museum opened in December 2014. It aims to engage and inspire more young people (11-15 years) to think that engineering could be for them and to date has attracted over a million visitors.

The exhibition provides visitors with access to interactive games and digital experiences as well as real artefacts and stories from professionals from a broad range of areas of engineering. Engineer Your Future aims to appeal equally to boys and girls and challenge teenagers’ perceptions of engineering as a low status, poorly paid job that is predominantly about fixing things.

Engineer Your Future was developed with a consortium of public- and private-sector partners that included National Grid, ABB, BT, the Department for Business, Innovation and Skills, EDF Energy, IBM, Mott MacDonald and Network Rail, with additional support from EngineeringUK and the Royal Academy of Engineering.

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² http://www.sciencemuseum.org.uk/online_science/apps/rugged-rovers