



Lloyd's Register
Foundation

Making an **impact**

Lloyd's Register Foundation
Review 2016

Life matters

July 2015

Networking event for Arkwright scholars

The Foundation hosted a visit by sponsored Arkwright scholars to network with LR's graduate team and surveyors and PhD students from other funded programmes.

Grant: The Conversation

Funding a dedicated editor to provide training and work with our researchers to disseminate findings to a wider public. £180k. See page 18.

Grant: UK's National Space Centre

Continued our support with new grant for lead educators and teacher CPD throughout the UK. £297k.

Grant: The Alan Turing Institute

Engineering applications of big data to improve safety through advanced mathematics, computer science, algorithms and big data. £10m.

Grant: National Maritime Museum

Delivery of a science education programme based on astronomy for primary and secondary schools. £104k.

October 2015

Foresight review on resilience engineering

Published Foresight review on resilience engineering: designing for the expected and unexpected. See page 9.

Foresight review on structural integrity and systems performance

Published Foresight review on structural integrity and systems performance: ensuring safety from the component to the system. See page 9.

Going beyond digitisation international conference

We hosted a two-day conference where representatives from innovative digitisation projects across the world discussed their different approaches to digitisation of records. See page 22.

December 2015

Grant: Royal National Lifeboat Institution

Training for volunteer lifeboat crews in sea survival skills. £1.1m.

September 2015

Grant: Maritime London Officer Cadet Scholarship

Training for three cadets at the UK's maritime training colleges, over the three years of their course. £108k.

November 2015

Grant: Educational Volunteers Foundation of Turkey (TEGV)

Funding a mobile science unit to bring facilities and teacher resources to remoter regions of Turkey. £132k.

Some highlights from our year 2015/16

March 2016

Grant: Invisible Me: Our Lives in Data

Funding a Science Museum exhibition exploring the subject of big data. Opening in July 2016 for 18 months. £250k. See page 17.

May 2016

Visit by graduates from International Maritime Law Institute, Malta

We hosted the annual visit of the new IMLI graduates. The Foundation sponsors three students each year.

Grant: Lloyd's Register Foundation Institute for the Public Understanding of Risk at the National University of Singapore

The first of its kind in Asia, undertaking research and education and building connections with practical end users. £10m. See page 19.

April 2016

ICON studentships announced: PhDs in nanotechnology

The International Consortium for Nanotechnology (ICoN) announced the award of its first studentships. See page 11.

June 2016

Grant: Project for the Safe Production of Marine Plants and Use of Ocean Space

Wageningen University & Research. Support for the safe production of marine plants and use of ocean space (SOMOS) project. £500k. See page 14.

Grant: Resilience engineering programme

The programme, in partnership with Arup, aims to make infrastructure more resilient in critical sectors including energy, transport, food and water. £10m. See page 15.

Making an impact

The Lloyd's Register Foundation is a charity that helps to protect life and property and support education, engineering-related research and public engagement.

Our vision is to be known worldwide as a leading supporter of research, training and education – relevant to the field of engineering – which makes a real difference in improving the safety of the critical infrastructure that is vital to modern society. To support this, we promote scientific excellence and act as a catalyst working with others to achieve maximum impact.

We do this because life matters.

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Key

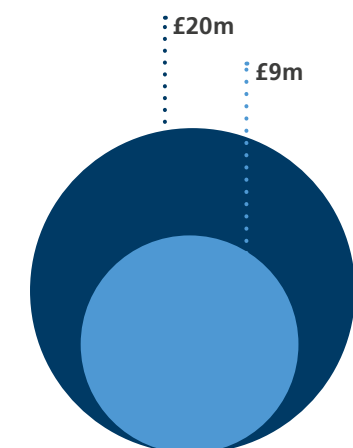
 Read more  Find out more online

Foundation at a glance

Our funding 2015/16

Foundation income
by source 2015/16

£29m



● Trading group income
● Listed investments

140

approaches for funding received
(outline proposals and applications)

95%

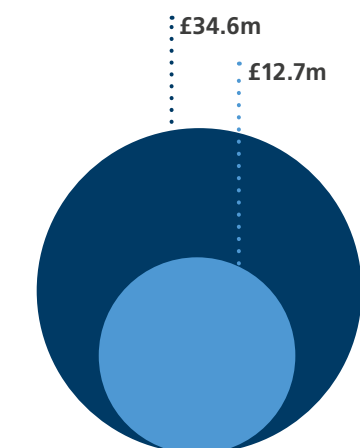
of new awards were 'directive', led by
the Foundation: 5% 'responsive', as a
result of unsolicited approaches

35

grants awarded in year

Value of grants awarded

£34.6m



● 2015/16
● 2014/15

Funding by strategic theme

	Supporting excellent scientific research	Accelerating the application of research	Promoting safety and public understanding of risk	Advancement of skills and education
New awards £34.6m	6 awarded in year, value £10.6m	3 awarded in year, value £10.6m	8 awarded in year, value £11.7m	18 awarded in year, value £1.7m
Active grants portfolio at 30 June 2016* £80m	26 grants, value £52.2m	3 grants, value £10.6m	8 grants, value £11.7m	36 grants, value £5.5m
Future grant commitments £60.5m	21 grants, value £36.7m	2 grants, value £10.5m	5 grants, value £11.1m	28 grants, value £2.2m

* Including past grants paid where recipients are still under obligations to report on their use of funds.

Making an impact In 2015/16

Articles written for
The Conversation
by the Foundation-
funded science editor
have been read over
6 million times



2,029
copies of our two
recent foresight
reviews downloaded
or provided in
hard copy

710
National Coastwatch
Institution watchkeepers
at 52 UK stations
trained for new radio
operator's certificate

Win for Foundation
sponsored student

Sophie Damy from
Imperial College won an EPSRC
£54,000 grant on her
LRF-funded PhD research



Our funding trained
283 RNLI lifeboat
volunteer crew
members from
35 lifeboat stations
which launched
4,695 times and
saved 4,271 lives

Our research grants
supported

124

PhD students

Building outreach

95,000

Reach through Facebook

618,586

Twitter impressions

350%

increase in traffic to our web pages

23

Our grants
reach 23 countries

Plus there are additional
international relationships
developed by grant holders

10

new PhD students selected
by open competitive call
through the International
Consortium on
Nanotechnology (ICON)

Chairman's statement

Delivering a balanced portfolio



Now in our third full year of operation we are seeing the Foundation continue to increase the scale of its grant funding strategy, with grants awarded more than doubling year on year.

Our purpose is more relevant than ever. A shift change in technological development in the fields of nanotechnology, data-centric engineering, robotics and autonomous systems is creating unprecedented opportunities and challenges for science and engineering. The Foundation is committed to meeting these head on to make a real difference in improving the safety of the critical infrastructure on which modern society relies.

Now in our third full year of operation we are seeing the Foundation continue to increase the scale of its grant funding strategy, with grants awarded in the year more than doubling year on year. The 2014-2020 funding strategy that we set out two years ago has given us focus to deliver a balanced portfolio of support to meet society's needs.

Fundamental excellent scientific research into the safety of the emerging disruptive technologies, mentioned in my opening paragraph, is vital to ensure that they are safely deployed to meet society's needs. Importantly, accelerating the application of that research into major infrastructure projects is needed to demonstrate impact.

We are also passionate about encouraging and supporting the next generation of engineers and scientists to advance our understanding of new technologies.

And finally, we play an important role in supporting safety and the public understanding of risk to ensure that there is a balanced and informed debate.



The strategy has guided our approach to grant giving and I am pleased to report that 95% of new awards were directive, where the Foundation actively seeks out long-term collaborations to meet its charitable objectives.

In 2015 we saw a renewed call on charities to demonstrate efficiency to maximise their contribution to society. The Foundation has demonstrated its efficiency, with 96% of expenditure during the year committed to direct charitable activities.

The call also served as a timely reminder for the sector to communicate effectively with all its stakeholders and society at large. Our efforts in promoting safety and the public understanding of risk serve to increase the public visibility of the great work that the Foundation carries out and the importance of continued research into societal challenges.

The work of the Foundation relies on income generated from our investments and the profits of our trading group, Lloyd's Register Group Ltd (LR). This year our funding from LR has risen to £20.2 million, and I would like to thank Alastair Marsh, who stepped into the role of LR's CEO in October 2015, his executive team and all the employees of LR for their enormous contribution.

Moreover, the Foundation also discharges its charitable purpose through the safety related activities of LR – such as safety inspections on 8,500 ships each year, the on-going development of rules for the safe construction and maintenance of ships, and verifying the safe design and operation of oil rigs – for the benefit of the public and environment. This unique relationship makes LR a truly special place to work and as a result, our colleagues feel a true sense of pride in their contribution to society.

I once again thank our trustees who continue to give their time and valuable expertise to guide the Foundation with strong governance and oversight. It is a credit to them all that they give their time freely and with undaunted passion for the Foundation's purpose.

I should also like to thank Michelle Davies who took over as Secretary of the Foundation in July 2015. Her experience has been invaluable in guiding us.

Finally I would like to thank Professor Richard Clegg, Foundation Chief Executive, plus all of the Foundation staff for their dedication, vision and enthusiasm in driving the Foundation from strength to strength.

Thomas Thune Andersen
Chairman, Lloyd's Register Foundation



Our efforts in promoting safety and the public understanding of risk serve to increase the public visibility of the great work that the Foundation carries out.

Foundation Chief Executive's review

Making big strides

“

My mantra running the Foundation is that the two ideas that drive us are impact and excellence.



This has been an exciting year for the Foundation. Our charitable expenditure in terms of grants awarded plus direct charitable activities has risen to around £34.6 million, equating to 118.9% of total incoming resources.

The major grants made were a £10 million commitment to the National University of Singapore (NUS) to establish a world institute with an Asian focus on the public understanding of risk; a grant of £10 million to Ove Arup and Partners International Ltd for a joint programme with the Foundation to build resilience in critical infrastructure; and a £10 million grant as a founding partner of the Alan Turing Institute to develop research and education in the area of data-centric engineering. Including these we have made a total of 35 grants this year, all in line with our five year strategy that we published in 2014.

As a Foundation we aim to make the world a safer place for the benefit of society, but we appreciate that safety and risk are emotive subjects. Sometimes the general public can have anxieties and preconceptions that are the opposite to reality. Our grant to NUS is important in this context in helping to establish an institute for the public understanding of risk, the first of its kind in Asia. In addition to undertaking multi-disciplinary research and providing education and training, it will also serve as a trusted, truly independent source of information and commentary on risk matters important in the eyes of the wider public.

Although we are a relatively young Foundation we are making big strides in pursuit of our charitable purpose. Each year we are committing to large grants with long durations, in some cases extending over 10 years. Our strategic aim is to build long-term collaborations in handpicked subject areas with leading experts, working on solutions to real world challenges that will truly make a difference. Consequently, our portfolio of live grants is expanding year on year. It is currently valued at around £60 million but expected to increase to about £150 million in the coming years. Reflecting this, we recognise that the focus

and priorities of the Foundation will have to evolve and mature as the Foundation changes from primarily awarding large grants to managing the resultant portfolio and working with our grants community to maximise their impact and benefit to society.

In 2016 we updated our five year plan. Our five year strategy still holds its value and remains unchanged, but the plan of how to get there has been updated to factor in experience and new opportunities. We have published a summary of the five year plan to publicly share the goals and outcomes we have set ourselves. It contains seven new goals: ensuring society has a trusted global evidence base for the safety of life and property; identifying and addressing safety grand challenges; further increasing the size of our live grants portfolio; strengthening our focus on education and skills plus public understanding of risk; establishing the future of our heritage collection; becoming a high performing charity benchmarked against others in the sector; and working together with our trading arm, LR, for a safer world.

My mantra running the Foundation is that the two ideas that drive us are impact and excellence. Excellence means working with the best minds in the world on relevant problems that have a clear pathway to application from the beginning. Impact is all about successfully delivering the vision and maximising benefit to society. In pursuit of this we started two initiatives in 2016. The first is an independent review of our impact looking at evidence of our track record plus the metrics and processes we use. This is a bold step that will give us confidence as well as provide a benchmark against which we can measure ourselves going forward. The second relates to the total footprint of our impact. We are cognisant that we can make an impact in many ways, not only by giving grants. We look forward to exploring these further in 2017 as we seek to optimise the impact of our charitable activities and operations for the benefit of society.

Our relationship with LR is a distinguishing feature of the Foundation in working together for a safer society. In addition to providing our income LR also provides us with an invaluable real-world perspective on the challenges facing the sectors we serve. Our unique relationship also helps us accelerate the uptake and application of technology and ideas arising from Foundation-funded work. We look forward to strengthening and leveraging this relationship in pursuit of working together for a safer world.

We set up an Advisory Council at the end of 2015 to assist the Foundation deliver its charitable aims. It provides independent expert advice, support and constructive challenge in areas including developing general strategy and plans, identifying new funding opportunities and emerging priorities, maximising impact plus suggesting other bodies to work with.

The Foundation's staff and trustees are fortunate to work with some inspiring and talented people, not least our grants

community, Advisory Council members, and others from LR that support us in so many ways. On behalf of the Foundation I would like to thank them all as well as extend my deep appreciation to the staff of the Foundation for all their hard work and professionalism. The success of the Foundation belongs to all of them.

Professor Richard Clegg
Foundation Chief Executive

Mission, vision, strategy

Our mission

To secure for the benefit of the community high technical standards of design, manufacture, construction, maintenance, operation and performance for the purpose of enhancing the safety of life and property at sea, on land and in the air.

The advancement of public education including within the transportation industries and any other engineering and technological disciplines.

Our vision

Our vision is to be known worldwide as a leading supporter of engineering-related research, training and education that makes a real difference in improving the safety of the critical infrastructure on which modern society relies. In support of this, we promote scientific excellence and act as a catalyst working with others to achieve maximum impact.

Strategic themes

1 Supporting excellent scientific research



For 2015/16 activities and impact see page 8

2 Accelerating the application of research



For 2015/16 activities and impact see page 12

3 Promoting safety and public understanding of risk



For 2015/16 activities and impact see page 16

4 Promoting advancement of skills and education



For 2015/16 activities and impact see page 20

Objectives

- | | | | |
|---|--|--|--|
| <ul style="list-style-type: none"> • Striving for excellence and impact • Promoting technology foresight • Building world-class research teams | <ul style="list-style-type: none"> • Accelerating technology uptake • Informing standards and policy • Facilitating the mobility of researchers | <ul style="list-style-type: none"> • Promoting the safety of life, property and the environment • Enhancing public understanding of risk • Maintaining and promoting a memory bank of safety and risk management developments | <ul style="list-style-type: none"> • Inspiring the next generation • Enhancing the knowledge and skills of the workforce • Widening access to disadvantaged and under-represented communities |
|---|--|--|--|

For full details of our strategy and five year plan see www.lrfoundation.org.uk/strategy

Strategic theme 1:

Supporting **excellent scientific research**



Objectives

- Striving for excellence and impact
- Promoting technology foresight
- Building world-class research teams

Page 11

One of the PhD's funded by ICON concerns ultrafast nanostructuring of wide bandgap SiC for electronics in harsh environments. For more details about ICON see the case study on page 11, a global network to advance the application of nanotechnologies.

Activities and impact

A review of progress under this strategic theme in 2015/16

Plans for 2015/16

Last year's Foundation review set out some of our indicative plans for 2015/16. These included: publishing foresight reviews in resilience engineering and structural integrity and systems performance, and opening calls in these subjects; implementing a global programme on data-centric engineering with the UK's Alan Turing Institute; reviewing where we can have the biggest impact with our research priority of human and social factors; initiating more foresight reviews in our emerging technologies research priority area; and planning for our next global research colloquium for 2016. The following review describes the progress we have made in these and other areas to support excellent scientific research to deliver our charitable goals.



Promoting scientific foresight

We have continued to seek independent expert opinion from the world of academia, industry and society to identify research challenges and where our funding can bring about the greatest impact.

In October 2015 we published two new foresight reviews in resilience engineering and structural integrity and systems performance:

Foresight review in resilience engineering: Designing for the expected and unexpected

The foresight review explores how resilience engineering could enhance the safety of life and property through the improved resilience of engineered structures, systems, organisations and communities around the world. The review was led by Professor Michael Bruno, Vice Chancellor for Research, University of Hawaii. Building on the findings of this review, the Foundation has launched a programme which is described further on page 15 of this annual review.

Foresight review in structural integrity and systems performance: Ensuring safety from the component to the system

Modern society depends on complex products and engineering systems whose failure can lead to catastrophic consequences. The performance and safety of these systems is an area where the Foundation can make a significant difference by targeting its research funding.

This foresight review guides the Foundation's grant giving priorities in order to fund high quality research which has a real impact on the safety of life and property. It identifies key safety challenges in structural integrity and systems performance and recommends five priorities for future research and development: ensuring the safe uptake of 3D and 4D printed parts; advancing the state of the art in engineering science challenges; developing an economic whole-system approach to demonstrate safety; advancement of data-centric engineering; minimising the risks associated with maintenance and inspection. The review was

led by Professor Michael Fitzpatrick, Lloyd's Register Foundation Chair in Structural Integrity and Systems Performance at Coventry University.

The review will be implemented by developing calls with delivery partners, and through technology roadmapping. A steering board for our structural integrity and systems performance priority area was established in 2016 which will oversee this implementation.

In 2015/16 the Foundation commissioned foresight reviews in two further subjects:

Foresight review in robotics and autonomous systems

Professor David Lane from Herriott Watt led this work. A workshop was held in March 2016 which focused on the opportunities, risks and gaps related to safety from the emerging technologies of robotics and autonomous systems. As well as the panel of experts from the workshop, a wider consultation was opened. The review was published in October 2016.

Foresight review in energy storage

Professor Nigel Brandon from Imperial College London is leading this work which will be published in early 2017. This review will explore the role energy storage can play in making systems safer and more resilient but also identifying obstacles to implementation.

Last year we planned to conduct a review in human and social factors. This work has been deferred to 2017 in order to focus on the priorities above.

The Foundation uses the foresight reviews to drive its emerging technologies research theme – to identify research challenges and where our funding can bring about the greatest impact.

For copies of our foresight reviews see www.lrfoundation.org.uk/publications

Highlights from our grant holders

International Consortium on Nanotechnology (ICON)

ICON opened its first research call resulting in the funding of its first 10 PhDs. For more details about ICON, see the case study on the next page.

National Structural Integrity Research Centre (NSIRC)

The NSIRC ran its first open research call attracting 49 proposals: of these 12, from three countries, were selected for funding. NSIRC also ran its second conference during the year including keynote speeches from Sir Harry Bhadeshia from the University of Cambridge and Dr Dolores Byrne from the Institute of Engineering and Technology.

University of Manchester

Nobel laureate Professor Sir Andre Geim's consortium, designer nanomaterials assembled from individual atomic planes, published a paper in the prestigious *Science* journal. This cited Foundation-funded work using graphene as a membrane to separate isotopes of hydrogen, opening the possibility of exciting applications such as nuclear clean up and desalination.

National Technical University of Athens

Professor Harilaos Psaraftis from the Centre of Excellence in Ship Total Energy-Emissions-Economy at the National Technical University of Athens had a paper classified as highly cited by Thomson Reuters with enough citations to place it in the top 1% of its academic field.

Pusan National University

Our funding to the Korean Ship and Offshore Research Institute at Pusan National University has leveraged \$100 million from the Korean government to establish world class testing facilities on a new 23.1 hectare site.

New grants

This year the Foundation started work with some new research partners. These include:

Alan Turing Institute

In 2015/16 the Foundation awarded a major £10 million programme to the Alan Turing Institute. This will focus on data-centric engineering, delivering many of the recommendations from the Foundation's Foresight review of big data: towards data-centric engineering. The Institute has employed a programme manager and secured its first cohort of fellows. Open calls for collaboration and for a programme director will take place in 2016/17.

Royal Academy of Engineering Fellowships

The Foundation supported the first of its RAEng/LRF postdoctoral research fellows. Critical infrastructures on which society depends increasingly use computer systems as a central component but these can be flawed. Mark Batty at the University of Kent will develop a rigorous mathematical description of concurrency to improve safety in such systems. The second fellow, Rebecca Boston at the University of Sheffield, will take up her fellowship in 2016/17.

Royal College of Arts

The RCA will work in partnership with the RNLI (another one of our grant recipients) setting its students the challenge of rethinking and redesigning the problems surrounding the transfer of people between ships at sea. This is an area where there are numerous accidents and fatalities each year.

Lloyd's Register Foundation International Conference 2016

During the year we started planning the first Lloyd's Register Foundation International Conference taking place in London 13-14 October 2016. The conference brought together our grant holders, industry and wider society to share what the Foundation has achieved and explore how we will proceed into the future.

Our future plans

In 2016/17 we plan to:

- publish a foresight review of global safety knowledge, analytics and data; this will identify where trusted safety data is available around the world and where there are gaps
- work with others, through a public campaign, to identify the major global challenges and opportunities facing humankind for the safety of life and property
- publish our foresight reviews in robotics and autonomous systems and energy storage and establish programmes dependent on the review recommendations; we will initiate at least three further reviews
- publish a roadmap on additive manufacturing to support delivery of our Foresight review of structural integrity and systems performance.

Our funding to the Korean Ship and Offshore Research Institute at Pusan National University has leveraged \$100 million from the Korean government to establish world class testing facilities on a new 23.1 hectare site.

For details of current programmes funded under this strategic theme see www.lrfoundation.org.uk/programmes

Case study

A global network to advance the application of nanotechnologies

Following a research call in August 2014, the Foundation funded The International Consortium on Nanotechnology (ICON) at Southampton University. ICON was awarded £3 million in 2015 with the aims of:

- developing a global capability in nanotechnology by providing partial funding for PhD studentships that address the recommendation of the Foresight review in nanotechnology, and
- establishing a research community in nanotechnology across our grant holders.

ICON, led by Dr Themis Prodrumakis from the University of Southampton, has established a programme management board of experts from academia and industry to provide governance and decision making to the project.

In 2015, ICON launched its first open research call targeted at the recommendations of the Foundation's Foresight review in nanotechnology. The ICON model is to provide seed funding for PhD studentships which must be supported by, at the least, matched funding from academia or industry.

One of the ICON students, Theresa Schötz (University of Southampton), working in a laboratory in Japan while undertaking preliminary studies relevant to her current project.

The first call attracted 27 proposals from universities across the globe, each of which went through a rigorous peer review by leading academics before a final selection was made by the project management board. Each project was assessed on novelty of the proposed project, quality of the proposal, fit with the recommendations of the foresight review, and relevance.

ICON announced that 10 proposals had been successful from eight countries: Australia, Germany, Japan, Malaysia, Singapore, Spain, UK, and USA.

During the year, Dr Prodrumakis wrote an article explaining why nanotechnology is important, Five ways nanotechnology is securing your future, for The Conversation, another of our grant recipients. The article was republished in the Guardian newspaper in the UK.

ICON announced its second call for proposals in June 2016. It is planning its first conference in April 2017 to bring together nanotechnology researchers from across the Foundation's grant portfolio together with industry in order to showcase the nanotechnology work that is being carried out by Foundation grant holders. The conference also will also engage with industry to better understand the challenges that future ICON calls can specifically address.



The support of Lloyd's Register Foundation is key to our mission. Lloyd's Register itself is well-known for promoting safety worldwide for more than 250 years. ...the Foundation has become a catalyst to support research, training and education for the benefit of society. We are delighted to work alongside them."

Dr Themis Prodrumakis,
University of Southampton

For more details see
www.lrf-icon.com



Strategic theme 2:

Accelerating the **application** of research



Objectives

- Accelerating technology uptake
- Informing codes, standards and policy
- Facilitating the mobility of researchers

Page 15

The Foresight review of resilience engineering recommended the Foundation set up a programme to build the resilience within and between critical global infrastructure sectors. Read more in the case study, a programme to build resilience in critical infrastructure, on page 15.

Activities and impact

A review of progress under this strategic theme in 2015/16

Plans for 2015/16

Last year our plans for 2015/16 included: carrying out external evaluation of the impact of our whole portfolio; embedding the Foundation's innovation model through our call for accelerating the uptake of research; considering how best to develop and deliver research networks focused on major infrastructure sectors; and supporting new grant holders to build end-user partnerships at the earliest stages of their research.

Here we describe the progress made in these and other areas to support the acceleration of the application of research to deliver our charitable goals.

Understanding our impact and improving our practices

We have commissioned the evaluation charity New Philanthropy Capital (NPC) to undertake an evaluation of the Foundation's impact in three areas of our activity:

- grant giving, including the impact of grants that originated under the Lloyd's Register Educational Trust
- external influence through other activities, such as our foresight reviews
- Heritage and Education Centre.

NPC will also provide recommendations to the Foundation on how it can improve and measure the impact of its grant giving.

In addition to the NPC study, the Foundation is communicating more regularly with its grant holders requesting examples of highlights and impacts from their research.

Highlights from our grant holders

Programmes that are funded under our supporting excellent scientific research theme can also provide impacts for the acceleration of application of research as in these examples.

Cardiff University

The Seafarers International Research Centre (SIRC) held a symposium at the end of its grant to disseminate its work and to build partnerships to ensure the work can be applied. It tested recommendations with stakeholders on two topics: improving the design and training associated with mandatory equipment; and improving the interactions between shore-side and shipboard personnel.

Imperial College: Centre for Transport Risk Management

Milena Studic is now an observer-member of the International Civil Aviation Organisation task force on ground handling, following her PhD research on this topic.

Gonzalo Tobaruela has built on his PhD on air traffic controller world modelling, automation and capacity estimation with the French air traffic control authority, engaging towards a trial implementation of the research, in the form of a tool, in one of its control centres.

Sophie Damy's PhD work investigated the safety issues around the use of satellite positioning systems for railway scheduling. She has developed this work and won a highly competitive EPSRC Impact Grant worth £54,000 and was the overall winner of the Imperial College '3 minute thesis' competition.

In addition to the impact achieved through its ongoing grant, the Imperial College centre was also awarded a new grant this year under the Foundation's scheme to accelerate the application of research. The grant was for modelling and assessing the factors that affect human performance in railway operations and maintenance – the role of automation, and supports further engagement with end users of the research.

Lancaster University

The LRF International Joint Research Centre for the Safety of Nuclear Energy used its Foundation grant to help leverage funding from the UK government to establish the UTGARD Lab (Uranium/Thorium beta/Gamma Active R&D Lab). UTGARD is a national facility for the study of new routes for reprocessing spent nuclear fuel.

NSIRC

All PhD students funded through our NSIRC programme are allocated industrial mentors. These mentors ensure the student has an understanding of the practical application of their research and help provide a route to accelerate the impact of the research.

Twente University

Twente's Jan Braaksma and Leo van Dongen delivered a professional course consisting of eight one-day master classes to maintenance professionals from 10 large international companies. Selected senior maintenance professionals follow this post-master level course to prepare for senior maintenance management functions. Twente also organised the first Maintenance Research Day 2016 which showcased an overview of all the research that is currently being undertaken in the Netherlands and Flanders in maintenance-related fields. More than 70 participants (PhD students, researchers and interested companies) attended the day and 20 young researchers discussed their own research during six different parallel sessions. The day was sponsored by Dutch World Class Maintenance and supported by NS-NedTrain.

University of West of England (UWE)

The 2016 Insaka International Symposium – jointly organised by the International Water Security Network (IWSN) and the Insaka Consortium – took place in Kafue, Zambia from 13-16 June 2016 on the theme of ecosystem benefits and water security. IWSN is a consortium led by the UWE. There were over 37 presentations from partner universities, research centres and practitioners, including South Africa National Parks (SanParks) and World Wide Fund for Nature (WWF). The symposium provided an opportunity to interrogate water issues from both an industry and a research perspective, as participants considered the realities of water resource issues faced by the productive and conservation sectors.

For details of current programmes funded under this strategic theme see www.lrfoundation.org.uk/programmes

New grants

We have given grants for two major new programmes under this strategic theme.

Resilience engineering programme to build resilience within and between critical global sectors

Following the recommendations from our Foresight review of resilience engineering, we have developed and awarded a five-year, £10-million joint programme with Ove Arup and Partners in resilience engineering. Further details can be found in the case study on the next page.

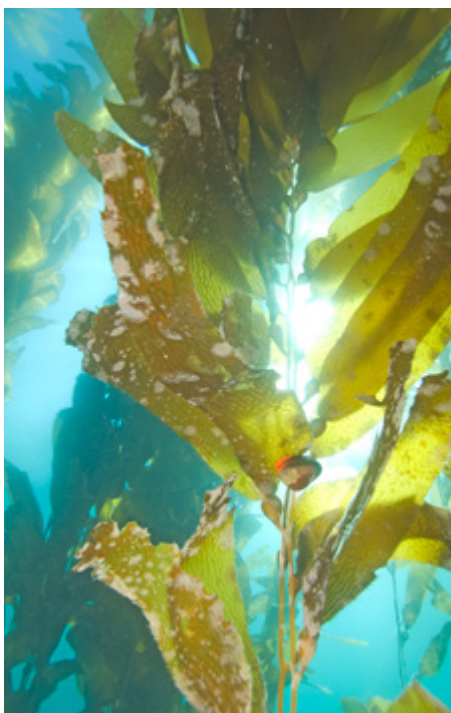
Wageningen University

We agreed a £500,000 grant to the world leading food sciences institution, Wageningen University, supporting the development of technical standards for safe production of food and feed from marine plants and safe use of ocean space. This is the first project targeted at the food sector to be funded by the Foundation.

Competition for maritime space is on the rise from a number of sources, including tourism, transportation, energy production, fishing and aquaculture. One solution is to share this space between multiple activities, which raises significant safety issues. This project aims to develop a meaningful safety assessment and controls for multiple simultaneous uses to enable the safe creation of energy sources and food at sea, in the form of aquatic algae (mostly seaweeds).

Although seaweed has been collected for centuries as a source of food and animal feed, logistics and safety issues have often hampered large scale production. Cultivation of seaweed presents a number of significant opportunities: it is a sustainable and efficient source of protein; it provides a natural desalination process; it absorbs carbon dioxide – contributing to greenhouse gas reduction; and its residue can be used to create energy through biomass.

Resilience describes how systems withstand, respond and adapt to disruptive events. These events can be short term shocks like storms, earthquakes and conflicts, or can be more predictable and longer term. What causes some businesses to survive change where others do not? Why do some countries and cities thrive under change while others struggle? How do some engineered structures and systems withstand adverse conditions while others collapse catastrophically? The answers lie in the consideration of resilience.



Future plans

In 2016/17 we plan to:

- publish the results from our external evaluation of the impact of our grants
- develop and adopt new practices to improve our impact and the way it is measured
- develop new programmes for accelerating the impact of research
- open up the first opportunities within our programme on resilience engineering for critical global infrastructure sectors.

“

We agreed a £500,000 grant to the world leading food sciences institution... This is the first project targeted at the food sector to be funded by the Foundation.

Case study



A programme to build resilience in critical infrastructure

Resilience engineering is one of the four research funding priorities in the Foundation's strategy. The Foundation's Foresight review of resilience engineering: designing for the expected and the unexpected, recommended the Foundation establish and lead a programme to build resilience within and between critical global infrastructure sectors.

Implementation of this programme, launched in January 2016, occupies a key building block in our strategy delivery. The programme is designed to focus on sharing existing experience and knowledge within and between sectors, rather than doing further research, so it is an important part of the delivery of our strategic theme accelerating the application of research.

Following a competitive international call, the Foundation selected the Arup partnership as the host institute and Dr Nancy Kete as the Director for the five-year, £10-million programme to build resilience in critical infrastructure.

The Foundation's programme will build resilience, for example, by addressing:

- governance: incentives, standards, rules, legal and financial
- capacity building and engagement: professional development, publications, communication and public engagement
- data and supporting tools: shared datasets, modelling and simulation, decision support
- international and global scale networks: studies of global systems, supply chains, knowledge networks.

The Foundation has received expressions of interest from dozens of organisations who would like to participate in the programme. Through the open call and through the publication of the foresight review, the Foundation has become a global catalyst in a movement to collaborate and build a discipline of resilience engineering. The programme under Arup's leadership will build networks of interested parties and harness this global expertise towards helping to achieve the Foundation's charitable aims.

“

I'm delighted to be leading this unique collaboration between Arup and the Lloyd's Register Foundation to build this programme. We've found such a good alignment around the concept of 'resilience engineering', and its importance in addressing global challenges. Likewise, between the institutional values of both organisations.

Arup is recognised as among the top engineering consultancy's in the world, with a reputation for high quality design and engineering standards. It's in Arup's DNA to pursue projects with a social purpose, and work collaboratively with clients, universities, and other partners. We are looking forward to creating new partnerships – with the private and public sectors, universities and civil society – to advance our collective understanding of how to build and enhance the resilience of critical infrastructure and thereby attain substantial societal benefits. Through our global networks, we are certain that Arup can bring to life the recommendations of the Foundation's Foresight review of resilience engineering – to catalyse an applied programme, accelerate the uptake of research already undertaken, and support rapid impact of the Foundation's investments.”

Dr Nancy Kete,
Programme Director

Strategic theme 3:

Promoting **safety** and **public** understanding of risk



Objectives

- Promoting the safety of life, property and the environment
- Enhancing public understanding of risk
- Maintaining and promoting a memory bank of safety and risk management developments



Page 19

The Foundation has committed a major grant of £10 million to establish a world-leading centre, Lloyd's Register Foundation Institute for the Public Understanding of Risk, in collaboration with the National University of Singapore (NUS). For more details see the case study, public understanding of risk institute is first of its kind, on page 19.

Activities and impact

A review of progress under this strategic theme in 2015/16

Plans for 2015/16

The 2015 review set out some indicative plans for the year. These included: developing the next stage in the digitisation of our archive for educational purposes; strengthening the outreach of the Heritage and Education Centre (HEC) via social media; holding a digitisation conference for holders of archive collections; reviewing where, as a Foundation, we can make greatest impact in the public understanding of risk; and continue strengthening links with our trading arm to add value to society.

The following reviews our progress in these and other areas to support promoting safety and public understanding of risk.

Major grant in the public understanding of risk

The area of the public understanding of risk is a main element of our third strategic theme. In 2016, the Foundation awarded a major £10 million grant to the National University of Singapore to establish an institute on the public understanding of risk, which will serve wider Asia and be the first of its kind in the region. This work will include a review of the issues and barriers connected with the public understanding of risk in order to identify the 'white space' where the Foundation can make a difference. Further details of this major grant in this important area are contained in the case study overleaf.

Our lives in data

One way we fulfil our charitable purpose is by supporting and working with other organisations that share our aims. The Science Museum in London is one such organisation. In 2015/16 we provided a grant of £250,000 as a principal funder of its exhibition on the subject of big data called Our Lives in Data, linked to one of our four strategic priorities, enhancing the public understanding of risk and communication of science.

Sponsoring the big data-related exhibition is an impactful way of reaching a large international visitor audience and inspiring the next generation on how big data is transforming the world around us. Our grant to the Science Museum is part of a wider portfolio of investments made by the Foundation in the general area of big data, including our £10 million grant over five years to the Alan Turing Institute.

1,100,277

total social media impressions

Strengthening our outreach via social media

The Foundation's social media presence can help to forge stronger relations with the general public, academics and professionals. During the year we recorded 1,100,277 total impressions across all the Foundation's social media platforms plus 52,840 hits on our website from 199 countries, with 72.6% of these due to new visitors. These figures do not include the outreach activities from our grants community via their own channels. Although this represents good progress there is still much for us to do in this space. For example, only 33.7% of the Foundation's website visitors were female; so we will be looking to improve on this gender balance.

Working with Lloyd's Register

Our trading arm, LR, helps to deliver our charitable aims. Our unique governance structure with the Foundation as the parent and sole shareholder of LR means we can work together towards making the world a safer place. The embodiment of this is that the Foundation and LR both share the same mission, of enhancing the safety of life and property and advancing public education.

We estimate that over two thirds of the services delivered by LR support the Foundation in working towards a safer society. In addition to this, the Foundation and LR also work seamlessly together on technology push-pull. It is the Foundation's aim to invest as a charity in areas that have a clear end-user application in mind; something that LR with its extensive sector experience and global reach can uniquely help with.

A further benefit is that LR also supports the Foundation through the input of its employees. During the year, LR employees who supported Foundation-funded schemes included: Chief Technology Officer Nial McCollam, on the selection board for the new post of the Alan Turing Institute programme director; LR employees acted as mentors for Arkwright scholars and PhD students around the world; Vincent Doumeizel, LRQA's Vice President Food, Beverage & Sustainability, on the advisory board of the Wageningen University project that will look at the safe creation of energy sources and food at sea (as mentioned on page 14); and Tom Boardley, Executive Vice President and Global Head of Corporate and External Affairs, on the board of the resilience engineering programme.

It is the Foundation's aim to invest as a charity in areas that have a clear end-user application in mind; something that LR with its extensive sector experience and global reach can uniquely help with.

Highlights from our grant holders

The Conversation

The Conversation is a news and analysis website where each article is a collaboration between an academic expert and a journalist. Its aim is to unlock research to help the public better understand the issues of the day. Articles are published online and re-published through a Creative Commons license.

Our grant will enhance public understanding of science by supporting a science editor who already has edited and published over 200 articles, attracting on average around one million page impressions a month across all re-publishers. Several articles have covered topics related to research we fund, for example in nanotechnology (7,000 page impressions) and extreme marine events (3,200 page impressions). The science editor has also helped train 170 academics to communicate their research expertise to the public, including several Foundation-funded PhD students.

CHIRP Maritime

CHIRP Maritime contributes to safety at sea by allowing seafarers to report in confidence where safety management systems fail to deliver to the required standards. Lessons are shared through Maritime FEEDBACK; 70,000 copies are distributed globally – to ships, by email, and on social media – in 47 countries. The results range from enhanced training and behavioural change to improvements in design, operation and maintenance.

Our funding has helped launch a new initiative. Eleven volunteer ambassadors in Hong Kong and mainland China, Philippines, Singapore, New Zealand, Australia and India, have given safety presentations to ship personnel locally, based on lessons learned, with a resulting increase in information on safety by ship managers.

Information from CHIRP's reports relating particularly to the human element has been included by the Maritime Coastguard Agency in its Maritime Guidance Note (MGN520), reaching all UK seafarers and training academies.

Leveraging its funding, CHIRP Maritime has attracted additional support that has enabled it to produce video broadcasts and audio podcasts based on the safety lessons shared in Maritime FEEDBACK, a promotional video, and to enable reports to be sent direct from a smart device with embedded photos.

National Coastwatch Institution (NCI)

Our grant to the UK's National Coastwatch Institution enabled training of 710 NCI members in the use of marine VHF channel 65. NCI operates over 50 stations around the British Isles, manned by over 2,000 volunteers providing the eyes and ears along the coast – monitoring radio channels and providing a listening watch in poor visibility. Marine VHF channel 65 was allocated for the specific use of its stations in 2015. This was hugely welcomed as previously it was restricted to using search and rescue (SAR) private emergency channel zero, but all watchkeepers had to be trained to a certificated level and NCI did not have the funding to do this. Since the implementation of this training programme, NCI stations have been involved in 130 incidents involving danger, or potential danger, to life or property within sight of its stations. The radio system has also been used to identify and prevent potentially dangerous situations from escalating. An added benefit is the reduction of non-essential traffic on the SAR distress frequency.

Nautical Institute

In January 2016, we supported publication of the final, 40th issue of *Alert!* the International Maritime Human Element Bulletin. This marked the culmination of a 13-year collaboration with the Nautical Institute to increase awareness of human element issues in the maritime industry, providing a suite of training material, including the bulletins, related videos and a significant reference library. All of this remains accessible and useable by students and training organisations worldwide, thanks to the Nautical Institute who continue to maintain the website. The 40th issue, edited as usual by Commodore David Squire CBE, includes testimonials from throughout the maritime industry about the importance of this body of knowledge to improving safety at sea.

Future plans

In 2016/17 we plan to:

- start work on ensuring that society has a trusted global evidence base for the safety of life and property
- identify and address grand challenges to safety taking into account public perception of risk
- establish the future of the Heritage and Education Centre's services and preserve its unique assets
- continue to maximise the value of the Foundation's unique governance structure and its connection with LR towards making the world a safer place.



Over 40 issues of *Alert!*, a range of expert authors from every part of the industry have helped to change people's views on the human element, showing – often with some memorable and easily digestible pictorial centrespreads – that it can make such a difference to ship design, to efficiency and above all to safety.

Michael Grey MBE, MNM
Patron of the Alert! project

For details of current programmes funded under this strategic theme see www.lrfoundation.org.uk/programmes

Case study

Public understanding of risk institute is first of its kind

In 2016, the Foundation committed a major grant of £10 million to establish a world-leading centre in collaboration with the National University of Singapore (NUS), to be named the Lloyd's Register Foundation Institute for the Public Understanding of Risk. The area of the public understanding of risk and communication of science is less developed in Asia compared to the UK and USA; and the culture, attitude, and role of science are different in Asian society. As a result, the Institute will be unique and the first of its kind in Asia. It will undertake research and education and build connections with practical end users such as policy makers, decision makers, and opinion formers in government, industry, regulators, the media, and general public. It will be multi-disciplinary, spanning engineering, statistics, sociology and psychology.

This collaboration with NUS heralds a unique opportunity for the Foundation to make a distinctive difference in the crucial area of the public understanding of risk. It also marks the contribution that the social sciences have towards achieving the Foundation's charitable aims.

Quite often, the public perception of risk far outweighs the actual engineering risk. The new Institute will help address this by building a better understanding of the socio-technological processes and factors affecting public opinion forming, and using this to produce new tools and approaches for uptake by the end users across Asia and other developing economies worldwide.

Sustainability and the long-term existence of the Institute will be ensured through some of the Foundation grant being used to establish an endowment fund that will underpin in perpetuity a number of key appointments. This includes a prestigious Chair to be named the Lloyd's Register Foundation Professorship in Public Understanding of Risk. A number of other key posts will also be endowed including fellows, distinguished visitors, and scholarships for PhD students with preference given to those from disadvantaged or under-represented communities. In line with its commitment to the Institute, NUS is to match the Foundation's grant with a contribution of £10 million to the endowment fund.



The public understanding of risk in Asia is a nascent field, yet it is of growing importance. This multi-disciplinary institute will be the first of its kind that transforms the way policy makers, industry leaders and the public perceive risk. This grant will enable NUS, in partnership with the Foundation, to take a leading role in shaping the future of risk communication in Asia.

Professor Ho Teck Hua,
Deputy President
(Research & Technology), NUS



Strategic theme 4: Promoting advancement of skills and education



Objectives

- Inspiring the next generation of engineers
- Enhancing the skills and knowledge of the workforce
- Widening access to disadvantaged and under-represented communities

Page 23

The Foundation aims to inspire the next generation of engineers. Under this objective It has funded the production of a video in the ERA Foundation's Born to Engineer campaign. Read more in the case study on page 23.

Activities and impact

A review of progress under this strategic theme in 2015/16

Plans for 2015/16

Our plans for 2015/16 included: progressing mapping of the UK STEM (science, technology, engineering and maths) landscape with the RAEng; considering funding a further apprenticeship scheme; investigating under-represented communities to widen access, such as women in engineering; extending our international reach; and moving towards a more targeted directive approach to grant giving in the skills and education area.

Leadership strengthened

In 2015/16 we made good progress reflected in the fact that we awarded 18 grants in the year and that the skills and education area now equates to about 18.3% of our total live grants portfolio. To further strengthen this area we appointed a new member to the senior leadership team to head up and review the direction of travel of our skills and education activities. We did not make as much progress in two of the areas stated above, linked to women in engineering and extending our international reach. The new head of skills and education will be revisiting these as part of his review.

STEM education analysis

In May 2016, after considerable analysis of the findings, the Royal Academy of Engineering published our joint STEM education report, The UK STEM education landscape. The report found that a wide range of factors influence study choices and career decisions, concluding that work is needed to address shortfalls in STEM teaching; the perception of engineering, especially in engaging with parents; and the closing of opportunities through students de-selecting subjects at an early stage. The report is available at <http://info.lr.org/stem-report-2016>.

The Royal Academy of Engineering has distributed hard copies of the report to senior industrialists, MPs, politicians and advisers in relevant government departments, members of the engineering profession and the STEM community. Along with further copies sent by email from the academy and the Foundation and downloads, the number distributed is around 2,000.

Widening access to HEC educational resources

As the custodian of the LR Library and Archive, we are committed to maintaining and promoting this unique resource and making it freely available to researchers for educational purposes. With Project Undaunted, and other projects in the pipeline, we aim to make far more of our material available online over the next few years. Other plans include a project to gain more information from the public about LR staff over the last 256 years and a project to make LR's historic statistics available online.

Making more material available online and our social media posts, combined with related media stories has resulted a 23% increase in the number of enquiries compared to 2014/15. We hope to see this rise further in 2016/17 as more historical resources are made available to the public for educational benefit.

Staff of the HEC have contributed to a digitisation bulletin and two publications during the year: statistical research on the shipbuilding output of various countries for a book chapter relating to labour in shipyards from the 1950s until now; and the introductory chapter for a marine technology encyclopaedia covering thousands of years of maritime history. The HEC aims to contribute to more publications and to continue to produce articles and papers for conferences using the teams' specialisations.

We continued to conduct seminars and lectures for visiting universities, with support from LR. We welcomed over 1,250 visitors to our historic London building, which is a steady increase on last year, in particular the number of visitors from universities.

Project Undaunted

To deliver the next stage of the HEC's pilot digitisation project of historic ship plans and reports, in 2105/16 we committed £1 million as part of our direct costs in this strategic theme. Over three years the HEC will rehouse, catalogue, conserve and digitise 10% of the 1.25 million items held in the Foundation's heritage collection. Project Undaunted will unlock this unique archive, much of it previously unseen by scholars, academics and the general public. It will be openly and freely available for the first time via the web using a searchable database, as a unique historical and educational resource.

The collection charts a wealth of information on topics including the progress of global maritime technology, shipbuilding and engineering over nearly three centuries. Ships' details in the archive include the *Cutty Sark*; *Mauretania*; *Sirius* – the first vessel to cross the Atlantic Ocean under steam; *Dunedin* – the first vessel to carry frozen meat from New Zealand to London; *Fullagar* – the first all-welded ship; and many more. Based on the success of Project Undaunted a decision will be taken in three years' time on tackling the remainder of the archive and putting it to work in line with the Foundation's charitable purpose.

“

We enquired about yachts that were owned by our family, we were able to learn about the yachts that my grandfather and uncle owned... we had no idea when we started the search.

First international digitisation conference

In October 2015 we held an international conference bringing together some of the best minds to discuss the digitised archive of the future. This was part of our aim to put our archive and heritage collection to work as a unique educational resource and a direct cost under this strategic theme. The conference, over two days, attracted over 90 delegates from 57 different heritage institutions across Europe and North America. It is noteworthy that over 97% of delegates said they would want to attend if the conference were run again. The insight and knowledge gained was also crucial in feeding into the design of the project plan for Project Undaunted.



Patrick Fleming, Associate Director, British Library was one of the speakers at the conference.

To see all the conference videos go to <http://info.lr.org/lrf2016-digiconf>

...over 97% of delegates said they would want to attend if the conference were run again.

Grant giving and grantholder highlights

We agreed 18 new grants in 2015/16, most related to widening access.

Engineering apprenticeships

In our contracts we specifically required four grant holders, EDT (Routes into STEM programme), Arkwright Scholarships Trust, the ERA Foundation, and Villiers Park, to address engineering apprenticeships. Villiers Park offers a holistic three-year programme of support, the Tyneside STEM Scholars Programme, including mentoring and support for parents, that was tested in two areas prior to its application to us for a funding contribution complementary to other sources.

Maritime London

The Maritime London Officer Cadet Scholarship enables young people aged over 16 to train as merchant marine engineers. There are no grants or loans available for this training so without scholarships, including the three scholarships we fund, the training would not take place. UK training has a high reputation worldwide for safety and the cadets are likely to go on to be future ship masters.

Educational Volunteers Foundation of Turkey (TEGV)

In Turkey, our funding enables a mobile classroom, Science Firefly, to reach disadvantaged children who have no access to science labs in their schools. TEGV brings science to life with practical experiments and encourages girls to participate.

Don Bosco Training Centre

Funding to the Don Bosco Training Centre in Timor L'Este, for a youth training scheme in certificated advanced welding skills, enables apprentices to be trained in skills to equip them for local industry demand.

University College London

Using our grant, University College London's Centre for Engineering Education convened an international research workshop to produce a publicly-available report on how to improve engineering education. The workshop took place in September 2016 in London.

Some organisations were funded again on the basis of the impact of previous grants.

CIFAL Scotland

CIFAL Scotland used our £6,000 to enable 12 participants, from Ecuador, Malawi, Mali, Kenya, Barbados, Democratic Republic of Congo, India, Pakistan, Philippines and the UK to enrol in a seven-week course in renewable energies for developing countries. The majority taking part were from the NGO and civil sectors, local government or educational institutions. All participants who received our funding completed the course, with 83% strongly agreeing the course content was relevant for their job.

Smallpeice Trust

The Smallpeice Trust reported on its 2014/15 grant to support a girls-into-engineering residential course and we agreed to fund a further course.

Children's Radio UK

Children's Radio UK reach a large audience through its radio and online content. We awarded it £15,000 to create a third 10-part series of audio and video, Science around Ships. With contributions from young people undertaking degree courses and the ship design and construction sectors, it will help explain and demonstrate the underlying science, with practical tips on the Fun Kids website to help children try the science at home. Both audio and video content will remain available to listen again and view in perpetuity. Children's Radio UK expect to reach 380,000 children through broadcast, achieve 6,000 downloads of audio content and 10,000 page views of web content. It is able to monitor and measure quality and effectiveness through its database of some 30,000 parents, who also engage.

University of Birmingham

Our grant to the University of Birmingham is to improve rail safety in China through a specially-developed MSc qualification which will be delivered at Beijing Jiaotong University.

Several 'new' grants were in response to reappraisals and renegotiations of existing grants, for example due to contract conditions or delays in progress, resulting in termination and entering into new contracts.

For details of current programmes funded under this strategic theme see www.lrfoundation.org.uk/programmes

Future plans

In 2016/17 we plan to:

- work with and through others to provide relevant skills and STEM education to people from truly disadvantaged and under-represented communities
- work with LR and others to identify target countries in which our intervention will improve the teaching of technological skills
- develop a programme of practical innovation skills training, further supporting our strategic theme to accelerate the uptake and application of technology
- improve ways to inspire the next generation by establishing an alumni group of Foundation-funded beneficiaries, to act as a 'ripple wave' spreading our values and aims
- establish the future of our heritage collection
- remain receptive to opportunities to work with world-renowned institutions which will enhance our own reputation as a known foundation.



Engineers are cool! I knew they did bridges and buildings but there is so much more!

Year 7 student responding to Born to Engineer videos

Case study

Addressing the skills gap: Born to Engineer

Engineering UK report that the lack of engineering skills could be costing the UK economy up to £27 billion per annum¹ and, for level 3 skills, the UK is generating less than half the people it needs. To help address this skills gap, the ERA Foundation, in partnership with other organisations and sponsors, runs the Born to Engineer campaign to:

- improve perceptions and inspire more young people into engineering careers
- encourage the most able students to consider engineering
- improve the diversity of engineers.

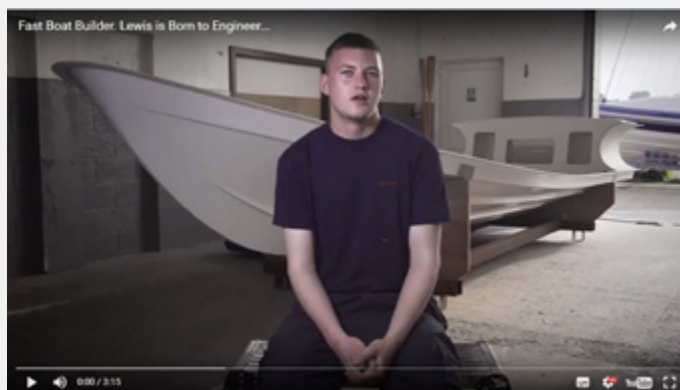
Professionally produced videos, hosted on the Born to Engineer website at www.borntoengineer.com/video, feature young role-model engineers talking about their studies and careers. In 2015/16 the Foundation agreed to fund the production of one video in this series.

The videos are widely used by organisations, teachers, career advisers and societies in teaching and outreach, promoted by partners, and in social and traditional media. Online partners using the material because of its quality and alignment with their own objectives include UCAS, IMechE, The

Manufacturer, the IET, and Royal Commission for the Exhibition of 1851, while the videos are shown and shared by, for example, Arkwright Scholarships Trust, Royal Institution, Smallpeice Trust, Imagineering, Young Engineers, and the Women's Engineering Society.

We ensured our grant funding to the ERA Foundation related to our objective of widening access. The video we funded features Lewis Wilde, a marine apprentice at Island RIBs, talking about his route into his apprenticeship. Lewis's testimony demonstrates the value of our grant to The Shipwrights Company Charitable Fund for a nationwide apprenticeship programme. It helped Island RIBs to offer Lewis an apprenticeship and he found the right career path for him. We hope the video will broaden knowledge of the diversity of engineering opportunities available to young people, informing their decisions, and encourage more to consider an apprenticeship.

The ERA Foundation will report to us in November 2016 on the impact and benefit of the grant. Our funding here recognises that a range of organisations working together can potentially make a real difference.



The video we funded features Lewis Wilde, a marine apprentice at Island RIBs

To find out more, visit www.borntoengineer.com

¹ http://www.engineeringuk.com/Research/Engineering_UK_Report_2015/

Governance and management



The Foundation is governed by a Board of Trustees, which is responsible for setting the Foundation's strategy, for ensuring good governance and that it fulfils its objectives – delivering public benefit.

We have worked hard to build up an appropriate governance structure that is consistent with our charitable vision.

1 Thomas Thune Andersen Chairman

Thomas is the Chairman of the Lloyd's Register Foundation and Chairman of Lloyd's Register Group Ltd. Thomas, a former Member of the Board for the A.P. Moller-Maersk Group with almost 32 years in the maritime and energy sectors, was appointed to the Board of the former Lloyd's Register in June 2010. Thomas is Chairman of Dong Energy A/S, Senior Independent Director of Petrofac, Vice Chairman of VKR Holding, the parent group of Velux and Non-Executive Director of BW Offshore Limited.

2 Lambros Varnavides Senior Independent Trustee

Lambros is the former Managing Director and Global Head of Shipping at The Royal Bank of Scotland. He is Deputy Chair of the Baltic Exchange and sits on its Finance and Charity Committee. He is also a court assistant to the Worshipful Company of Shipwrights and Chair of its Finance Committee. He was appointed Senior Independent Trustee of the Lloyd's Register Foundation on the 29 September 2015 and chairs the Grants Committee.

3 Sir Brian Bender

Brian retired from the Civil Service in 2009 having been a Permanent Secretary for nearly 10 years. His final position was at the Department for Business, having served previously at DEFRA. He is Chairman of the London Metal Exchange, Chair of Water UK, a governor of Dulwich College and Non-Executive Director of the Financial Reporting Council and Pool Reinsurance, among other posts.

4 Ron Henderson

Ron is a Chartered Accountant and former CFO of Network Rail and Balfour Beatty. In addition to other non-executive roles he also served on the UK Auditing Practices Board. Ron chairs the Audit Risk and Investment Committee. Ron is also a Non-Executive Director of Lloyd's Register Group Ltd.

5 Rosemary Martin

Rosemary was appointed Group General Counsel and Company Secretary of Vodafone Group in April 2010. She previously served as CEO of the Practical Law Group, having spent 11 years with Reuters Group Plc in various company secretary and legal roles – the last five years as Group General Counsel and Company Secretary. Before joining Reuters, she was a partner with Mayer, Brown, Rowe & Maw. Rosemary was admitted as a solicitor in 1984 and holds a degree in Philosophy and Literature and an MBA in Legal Practice. She is a member of the Financial Services Authority's Listing Group Advisory Committee and an Independent Non-Executive of Ernst & Young.

6 Carol Sergeant CBE

Carol has non-executive positions on the boards of Danske Bank and Tullett Prebon plc. She is also Chairman of the whistle blowing charity Public Concern at Work, Chairman of the BSI Standards Strategy and Policy Committee, a member of the Governing Council and Trustee of the Centre for the Study of Financial Innovation and member of the Cass Business School Advisory Board. She has previously been Managing Director on the board of the Financial Services Authority, and Chief Risk Officer at Lloyds Banking Group, having begun her career at the Bank of England.

The Board is currently made up of six trustees who are also the members and directors of the Foundation for Companies Act purposes. The Board considers Foundation policies, receives committee reports and recommendations, approves annual budgets, reviews the performance of the trading arm, and guides the Foundation Chief Executive.

The Board is supported by four sub-committees, which have delegated authority on certain matters (investment; grants; audit and risk; and nominations). Trustees and other non-executives sit on these sub-committees.

The Foundation Chief Executive, Richard Clegg, is responsible to the Board for the operation of the Foundation.

In the future, there are likely to be factors inside and outside the Foundation's control that are relevant to achieving our objectives. In the case of the management of risks, these are monitored by the Board of Trustees and the Audit and Risk Sub-Committee. Risks are identified and assessed and controls are reviewed throughout the year. We have worked hard to build up an appropriate governance structure that is consistent with our charitable vision. Under this structure, there is a clear separation between the Foundation's charitable activities and the profit-making activities of LR.

An Advisory Council was set up at the end of 2015 to assist the Foundation on delivering its charitable aims. It provides independent expert advice, support and constructive challenge in areas including developing general strategy and plans, identifying new funding opportunities and emerging priorities, maximising impact plus suggesting other bodies to work with. The Advisory Council meets twice a year.



Lloyd's Register Foundation leadership team

Front: Dr Ruth Boumphrey, Director of Research; Professor Richard Clegg, Foundation Chief Executive; Victoria Culkin, Head of the Heritage and Education Centre
Back: Eileen Kinghan, Grants Services Manager; Dr Jan Przydatek, Programme Leader for Structural Integrity and Systems Performance; Dr Tim Slingsby, Director of Skills and Education; Stephanie Zahra, Stakeholder Manager and EA to Foundation Chief Executive

Organisational structure

The Foundation has a total of 16 dedicated staff. A service level agreement exists between the Foundation and its trading arm, LR, for the provision of specialist business support including finance, HR, communications, legal and IT. The Foundation pays for these services at an agreed market rate.

The Foundation Chief Executive has delegated authority from the Board to approve grants up to £150,000 and to incur expenditure agreed by the Board. Applications between £150,000 to £250,000 must be approved by the chair of the Grants Committee and that can happen either side of the monthly grant application meetings. Applications over £250,000 must first go to the Grants Committee then to our Board of Trustees, which meets quarterly. Final decisions on these applications are made by the trustees.

Grant making policy

The Foundation has a formal governance structure for grant decision making. The Foundation can receive grant proposals and applications at any time. All proposals and applications are reviewed initially at our monthly grant applications meetings.

Details of available funding and the application process are published on our website and notified on social media. Grant holders are required to submit staged reports as part of the process to track delivery against the agreed grant objectives, as well as to monitor the impact and public benefit being generated.

For details about the Foundation and the Advisory Council membership see www.lrfoundation.org.uk/about-us/



Lloyd's Register
Foundation

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Life matters

