

Supporting excellent scientific research.



This year, we have published foresight reviews on the future of ocean engineering and food safety. We have also initiated new insight-led activity on the safety of fishing and ferry industries.

Promoting scientific foresight

The foresight reviews published over the last year are the result of engaging with global networks that provided diverse views around core themes. The findings provide society with a view of the future and allow the Foundation to identify where it can have the greatest impact in pursuit of its charitable goals.

Future of Ocean Engineering Foresight Review

Workshops were held in Singapore, Southampton, UK and St John's, Canada engaging a wide range of experts to consider the future of ocean engineering. The review sets out a wide number of challenges and recommendations that will be published and used to inform the direction of our future programmes in 2020.

Future of Food Safety Foresight Review

The Foundation held events in Paris, France and San Diego, USA to discuss the future of food safety. The insights gathered so far were shared with the UN's Food and Agriculture Organisation (FAO) in Rome, Italy, where discussions centered on the development of technologies delivering blockchains, microbiomes and offshore sea farms. The review was launched at the FAO in September 2019.

Safety in fishing industry

Our insight report on the safety of fishing published in June 2018 identified three countries that had the highest fatality rates for fishers; one of these was the Philippines. In order to address these issues, a key recommendation from the report was to understand the unique challenges in specific countries and co-develop safety solutions with local stakeholders. In response to this the Foundation supported the Fisheries and Marine Institute of the Memorial University of Newfoundland and the FISH Safety Foundation with a grant of £149,675 to collect baseline data on the current situation in the Philippines using consultations and analysis of stakeholder data to develop specific recommendations that address the challenges. The grant also aims to build a coalition of supporters who will pilot the recommended interventions and support and sustain these initiatives into the long term.

Safety in ferry industry

Our insight report published in June 2018 used historical statistics to also identify the Philippines as having one of the highest numbers of ferry fatalities; however, recent statistics indicate a rapid improvement with no lives lost in 2018. The Foundation funded a study due to report in October 2019 (value £41,400), conducted by the industry association Interferry, with the aim of understanding the safety enhancements that worked and sharing lessons learned in other geographies.

National Structural Integrity Research Centre (NSIRC) – Five years in

We are halfway through our first major grant which has so far funded an equivalent of more than 48 years of PhD research in structural integrity. Of this sum, 45% of researchers are female which compares favourably against a UK average of less than 10% of female engineers working in industry.

Two notable student successes in the last year have been Madie Allen and Cui Er Seow. Madie won an open international competition by the US National Institute of Standards and Technology (NIST) for modelling residual stresses in an additively manufactured part. Cui was awarded best presenting author at the American Society of Mechanical Engineers (ASME) conference on how her work on properties of additive manufactured parts is providing insights into new testing and manufacturing standards.

A significant number of these projects will underpin the standards, test methods and assurance tools used by society into the future.

Opening access to research infrastructure

Globally, there are many excellent researchers who are unable to maximise the outputs of their work because they lack access to international research infrastructure. In the last year the Foundation launched international calls with the aim of assisting researchers to gain access to resources that they would otherwise find inaccessible. The trial was, however, unsuccessful with very few applications received from target communities. We believe that our inability to reach target communities in developing economies prevented this initiative from achieving its aims. We are taking the lessons learned and strengthening our strategic communications and stakeholder engagement to understand how to reach future target audiences better.

Energy Storage Foresight Review

Our plans to initiate activity taking forward the recommendations from our Energy Storage Foresight Review did not become a reality in 2018. It proved more difficult than we anticipated to engage with the community to identify an intervention where the Foundation could make a distinctive difference. However, we anticipate using the findings in developing our challenge-led programmes within our new strategy in areas such as safety and sustainability.

Solid bulk cargo liquefaction: Strategies for effective control

Solid bulk cargo liquefaction in ships has been responsible for the loss of more than 100 seafarers' lives and nine bulk carriers in the last decade. This corresponds to 10% of recorded bulk carrier losses and 50% of fatalities, indicating the seriousness of vessel loss due to cargo liquefaction. An invitation to Southampton University to submit a proposal has galvanised the industry into an unprecedented collaboration. A plan of research, education, communication and new operational protocols has been co-developed with insurers, ship owners, mining companies, a regulator, a classification society, trade associations, lawyers, technology and engineering consultants, unions and charitable organisations that protect seafarers' safety. These improvements will lead to better awareness and operational controls to address the problem and save the loss of life and property.

Effective crew strategies

The Foundation supported research at Southampton Solent University to investigate the safety implications of different patterns of working for maritime crews. This was showcased at the International Maritime Organisation's Cross-Industry Conference on 31st January 2019. The work is available for others to build on and we will continue to observe for evidence of its application and impact.

Open-access journal in data-centric engineering

Working in partnership with Cambridge University Press and the Alan Turing Institute, we supported the creation of a new data-centric engineering journal which publishes high-quality research that exploits data to inform the development of engineering systems and products in order to reduce risk, and to improve reliability, resilience, safety, efficiency and usability. Papers will be authored by and for researchers beyond the usual academic communities to enable maximum impact. The Foundation's grant supports the open access aspects of the journal allowing this to be freely accessed by users who would otherwise not be able to afford access to high quality peer reviewed knowledge. They were awarded £250,000 over five years.

Seoul National University

The Foundation awarded a grant to Seoul National University, building on previous work. They will be developing innovative technologies in ship design with a particular focus on ship performance in waves and applications of new hull-form design. They were awarded £600,000 over three years.



Future plans

In 2020 we plan to:

- Consult on and publish foresight reviews on cyber security, space technologies, human factors and the future of regulation.
- Initiate activity in response to our new challenge-led strategy.
- Increase collaboration amongst our grant holders.

As part of producing our plans in these areas we will be developing metrics to gauge their impact and benefit to society.

CASE STUDY

Data-centric engineering programme – Alan Turing Institute (ATI).

In 2015 we awarded a five year grant of £10 million to the Alan Turing Institute (ATI) to grow a new capability we named Data Centric Engineering (DCE). Its aim is to address the safety challenges that step changes in data-driven technology and artificial intelligence will create in engineering and industry. The programme aims to bring together world-leading academic institutions and major industrial partners from across the engineering sector to build collaborations and maximise impact.

2018/19 has seen a period of intense growth for the DCE programme. Over the last 12 months the programme grew from 30 programme researchers to more than 80, from 20 active projects to over 40, and brought in £13 million of new funding leveraged from the investment made by the Foundation. The 3D printed Bridge project continues to impress with the overall project and ATI-led components being recognised through the award of a number of prestigious high profile international prizes. Likewise, the development of formal strategic partnerships with the London Mayor's Office, Shell, National Air Traffic Service, Rolls-Royce and many others are leading to a higher profile in the UK national and international press as well as on social media.

New Group Leaders were appointed from Rolls-Royce, Cambridge, UCL, and Queen Mary's University. The DCE international footprint is also developing apace with strategic partnerships in Australia building on the Foundation's Trading Group work on the Shell Prelude FLNG facility. Canada, with its massive scale federal and provincial government investment in artificial intelligence is another geography where DCE is establishing strategic partnership.

As the programme has grown it has also formalised its processes and procedures, setting in place an impact framework, a reporting structure for programme leads, a new website and public seminar series, and a coordinated pipeline of new industry partners. As we move into the fourth official programme year, it is now looking at how to maximise impact, through an innovation and commercialisation plan, an international engagement strategy, and through significant new industry partnerships. The programme will also be preparing for a major international conference and the launch of a new DCE journal with Cambridge University Press to solidify this field as a vital new area of academic and industry interest.

