

Science and Evidence Delivery Plan 2019–2020

Foreword

Science, engineering and evidence underpins the work of HSE, and provides a basis for robust decision making. It is a requirement for HSE under the HSW Act to, ‘make such arrangements as it considers appropriate for the carrying out of research and the publication of the results of research and the provision of training and information, and encourage research and the provision of training and information by others’.

Our [Science and Evidence Strategy](#) and our [Science and Evidence Investment Plan](#) describe how we do this, and how this links to HSE’s [broader strategy and plan](#). This science and evidence delivery plan provides more detail on what we will actually deliver.

Increasingly, our work is funded jointly with other organisations as ‘[Shared Research](#)’, which enables us to develop shared solutions to problems faced by both the regulator and the regulated.

We have also published our [Areas of Research Interest](#) so that others (including the Research Councils) can see the big questions we would like to address. Central to our approach are the science hubs; each provides a focus for thinking and enables us not only to consider the issues of today, but also how we might address the knowledge gaps to equip us to deal with the future world of work.

The outputs from our work include a suite of national statistics, post-implementation reviews, peer reviewed publications, involvement in national and international committees as well as significant contributions to technical conferences and sector-specific events.

Our knowledge is transferred through training and through commercial activities so that the information we generate is available in a suitable form for those who will benefit from it.

The data we collect is now informed by our Measurement Strategy to evaluate the success of HSE’s interventions and, through growing external investment, we can create more intelligence from our cumulative data collected over the last 40 years for the benefit of others, both in the UK and overseas.

HSE’s mission is the prevention of work-related death, injury and ill health. The science, engineering and evidence that we provide each year supports this mission and enables a better working world.

Professor Andrew Curran
*Chief Scientific Adviser and
Director of Research*

Regulatory frameworks which are fit for the future

Vision: Regulatory frameworks which are fit for the future ensuring health and safety compliance and enabling innovation in the workplace.

The aim of the programme of work in this science hub is to develop our understanding of the current and future world of work and to ensure that our regulatory framework is fit for purpose.

In recent years, HSE has undertaken an extensive review of health and safety regulations and has simplified the regulatory framework, making legislation easier to understand and comply with.

We will continue with this work, ensuring science, engineering evidence and analysis underpins and makes a significant contribution to meeting the government's better regulation agenda and Business Improvement Target.

Research in this science hub will be developed to understand how well current regulatory frameworks can accommodate expected trends in work demographics, working patterns, technologies, health hazards, new uses for old substances and how regulatory frameworks may need to change.

It will also provide the evidence base to target improvements in regulation where required. We will develop evidence for innovative approaches to regulation through collaboration across HSE and other government departments, to make sure we maintain our world-class reputation for regulatory excellence.

Work in this science hub links to the following key action in HSE's Business Plan:

- Provide an effective regulatory framework

What did we deliver in 2018/19?

- Provided analytical support to policy development including impact assessments (eg Carcinogens and Mutagens Directive) and post-implementation reviews (eg Biocidal Products and Chemicals Regulations)
- Contributed to the government's work on the UK's exit from the European

Union, including preparing for any necessary changes to the chemicals regulatory regime

- Worked across HSE and industry to develop shared research in the areas of remote visual inspection and wearable devices for health and safety

Our priorities for 2019/20

- Further develop our approach to using our evidence base to inform future regulatory approaches and ensure serious risks are diagnosed and proportionate action is taken
- Through concepts such as the Regulatory Intelligence Hub, develop links between regulators where data and intelligence can be shared to improve efficiency and effectiveness
- Develop relationships and research that will help address the health and safety aspects of the UK's Industrial Strategy, ensuring that HSE remains an enabling regulator for innovation in the workplace
- Progress work that will help us understand the role of technology in helping support our regulatory framework. This will range from exploring trends and drivers for change in regulatory approaches, to opportunities to enhance our regulatory functions through use of technology such as artificial intelligence and the internet of things

Our objectives for 2019/20

- Create HSE research topic groups in strategic areas (eg artificial intelligence) to help coordinate, develop and disseminate research
- Develop a programme of research on workplace sensors that will coordinate the challenges, opportunities and pitfalls of using this technology for workplace health and safety

Our key projects for delivery 19/20 and beyond

<i>Impact and analysis</i>	Provide analytical support to policy development including impact assessments and post-implementation reviews	Ongoing
	Support regulatory change following the UK's exit from the European Union	Ongoing
<i>Machinery controls</i>	Provide insight about emerging technologies in the field of machinery controls to inform future HSE policy and guidance	Q3¹
<i>Targeting interventions</i>	Improving the approach to validating sites for inspection using new data and updated methods	Q3
<i>Process improvement for land use planning</i>	Integrating the collection, storage and management of spatial data to improve the efficiency and efficacy of HSE's statutory land use planning responsibilities	Q3
<i>Local exhaust ventilation (LEV)</i>	Investigate the feasibility of using effective commissioning of LEV to establish benchmarks for performance monitoring and potentially replace the need for annual statutory test (TEXT)	Q3

¹ The dates given for all delivery/milestones are based on the latest information and therefore subject to change.

The right evidence for the future

Vision: To take a long-term view on the development of the evidence base that can support HSE's long-term strategic approach.

HSE's work is underpinned by robust scientific evidence. Our evidence base needs updating to reflect the rapid and complex changes in the workplace, workforce, working patterns and the working environment, and, as a result, the changes of HSE's priorities and intervention strategies.

To ensure our evidence-gathering systems continue to be effective and efficient – not only fit for current priorities and intervention strategies but also flexible enough to meet future challenges – we need to make our evidence base coherent, strategic, future-proofed, and focused on priority areas.

We will keep abreast of the advances in measurement science and technology to improve evidence gathering. We will make

best use of new data collection, modelling and analytical techniques to provide insight for our decisions on prioritisation, targeted intervention, tracking progress and evaluation of impact.

Where appropriate, we will publish our data and methods and share technical expertise in data analytics and measurement science with other regulators and enhance our regulatory intelligence networks.

Work in this science hub links to the following key actions in HSE's Business Plan:

- Lead and engage with others to improve workplace health and safety
- Provide an effective regulatory framework

What did we deliver in 2018/19?

- Published a comprehensive suite of health and safety statistics, to time and quality standards and with further enhanced presentation
- Developed a coherent overall package of measurement plans to support the monitoring and evaluation of the Health and Work programme, as part of implementation of the HSE Measuring Strategy
- Completed several projects to improve HSE's evidence base for effective risk management in areas of cryogenic liquid spills, warehouse fires at whisky storage sites, fairground rides, safety-critical roles, wood dust exposure and modern airborne disinfection

Our priorities for 2019/20

- Coordinate the delivery of the measurement plans and ensure the delivery joins up with other relevant areas of work across HSE
- Collect, compile and publish statistics on work-related ill health, injuries and associated impacts
- Provide appropriate statistical and analytical support to HSE's policy, communications, sector and operational teams
- Develop further the Workplace Intelligence System for Exposure-control in Great Britain (WISE-GB)
- Explore an alert system for identification of new and emerging health and safety risks
- Continue to explore suitable approaches to meet challenges and opportunities of advances in measurement science and technology

Our objectives for 2019/20

- Informed by the Measuring Strategy, deliver the measurement plans to assess the impact of the Health and Work programme in the health and safety system
- Communicate and translate the improved evidence base and lessons learned to inform the continued development and implementation of the Health and Work programme

Our key projects for delivery 19/20 and beyond

<i>National statistics</i>	Publish a suite of health and safety statistics	Q3
<i>Monitoring and evaluation of interventions</i>	A longitudinal survey of employers and employees to measure changes in awareness, behaviours and control measures	Ongoing
	Conduct secondary analyses of the Health and Work programme evaluation baseline survey and other relevant surveys to better understand employers' and employees' awareness, behaviours and control measures of work-related ill health risks in Great Britain	Ongoing
	Informed by our measuring strategy, implement a coordinated and consistent approach to measurement to assess the impact of the Health and Work programme. and make this approach visible nationally and internationally	Q2
	Monitoring and evaluation of the Going-to-the-Right-Places (GttRP) project	Q3
<i>Data collection</i>	Capturing workplace exposure-control intelligence from health-related evaluation visits by HSE inspectors	Ongoing
<i>Measurement science and technology</i>	Advancing measurements of occupational exposure to metals hazardous to health for effective risk control	Ongoing
	Advancing the measurement of occupational exposure to respirable crystalline silica (RCS)	Ongoing
	Measuring asbestos in air and lung samples; assessment of an alternative method	Q4
	Ensuring better isocyanate exposure assessment to better protect health at work	Q4
<i>Modelling and risk assessment</i>	HSE's modelling for predicting chlorine dispersion in the 'Jack Rabbit II' experiments to provide the right evidence base for land use planning	Ongoing
	Development and maintenance of risk assessment models and guidance for land use planning	Ongoing
	Sensitivity and uncertainty analyses of the regulatory model, HardSPEC, for herbicide use	Q1
<i>Methodology</i>	Feasibility study for developing an occupational exposure intelligence system in Great Britain, using respirable crystalline silica (RCS) as an example	Ongoing

The impact of demographic change on the health and safety of the future workforce

Vision: To provide a body of evidence that supports mitigating, preventing and managing the impact of demographic changes on the health and safety of the future workforce, informing interventions and solutions while positioning HSE as the thought leader in this area.

A future health and safety challenge will be managing the risks from changes in the demographic profile of Great Britain's workforce. This science hub aims to identify emerging hazards and risks arising from these changes, including consideration of the interaction between demographic changes, and changes to the work environment and work organisation.

Demographics typically involves the statistical study of human populations (eg in terms of size, distribution and characteristics), but we are adopting a wider interpretation of the term to cover contextual factors – changes in the workplace, including technological change and changes in exposures – and factors such as skills.

The longer-term aspirations for the demographics programme of work are to mitigate, prevent and manage the impact of adverse demographic changes on the health and safety of the workforce and help optimise efficient and productive future working. The outputs from the programme will inform appropriate interventions and solutions, and position HSE as the thought leader in demographic change related to occupational health and safety.

Dutyholders will be better prepared and use appropriate interventions and solutions to manage demographic risks, demographics evidence will be used to support delivery of commitments in our sector action plans, and our policy making will be informed by demographic and foresight evidence – making it more relevant for the future workforce.

Ten areas with gaps in demographics knowledge and evidence have been identified:

- understanding and managing extended working lives;
- competency and skills for the world of work;
- risk attitudes and behaviours;
- working with chronic conditions;
- impact of technology;
- insecure and remote working;
- impact of sedentary work;
- impact of occupational exposures on working for longer;
- women's health; and
- understanding and managing communication and engagement in the future workforce.

These areas were refined into four priority areas of research interest: extended working lives; competency and skills; risk attitudes; and behaviours and working cultures (including understanding the health and safety impact of a 24/7 always-on working culture).

Our work will address these areas, along with the health and safety challenges that arise from the interaction between them. Work in this science hub will link to the following actions in HSE's Business Plan:

- Secure effective management and control of risk
- Lead and engage with others to improve workplace health and safety

What did we deliver in 2018/19?

- Completed a scoping study (and engagement exercise) that identified the focus for HSE's work on managing health and safety risks from extended working lives. This obtained knowledge on the risks from extended working lives and identified gaps in knowledge and priority research questions for HSE
- Completed research and produced a report on the gig economy. This set out the key characteristics and size of the gig economy, along with potential health and safety implications
- Produced new project outlines to address the priority research questions identified in the extended working lives scoping study – using the evidence from the gig economy work to inform these
- Continued our collaboration with the University of Manchester to improve our understanding of the health of older professional drivers, and supported production of industry-led guidelines for promoting health and wellbeing in this cohort of workers
- Engaged widely with academia and others to discuss collaboration, funding and potential to deliver joint research

Our priorities for 2019/20

- Commission and begin project work to obtain evidence that addresses the research questions identified during 2018-19
- Continue engagement activity both within HSE and with external stakeholders
- Continue using evidence generated from demographics foresight activity
- to anticipate and keep pace with demographic change, and to identify potential implications for HSE
- Continue monitoring demographic research being undertaken by others, and review gaps in knowledge and evidence about the impact of demographic change on the health and safety of the future workforce

Our objectives for 2019/20

- Collaborate with the Thomas Ashton Institute to increase the existing body of demographics evidence – explore a joint National Institute for Health Research bid based on evidence from collaborative research to date
- Continue engagement with existing stakeholders, and extend this network, to improve HSE’s current knowledge and understanding about the impact of demographic change on workplace health and safety

Key projects for delivery 19/20 and beyond

<i>Extended working lives</i>	Feasibility study: building a numerical ‘picture’ of extended working lives	Q3
	Understanding changes in risk attitudes and behaviours	Starting 2019/20
	The impact of practices used for managing extended working lives	Starting 2019/20

The right intervention strategy for the British industrial asset base

Vision: To have effective intervention strategies that enable innovation with the British industrial asset base while minimising risk and improving occupational health and safety.

Our work in this area supports all industrial sectors across Great Britain, including the many highly specialised industries which are strategically important to the country's economy and social infrastructure including oil and gas, chemicals, explosives, mining and the bioeconomy, and all operating assets within the major hazards sector.

This sector can potentially cause great harm to their workers, the environment and the public if associated risks are not properly managed. New technologies are also being introduced to secure the future energy supply and reduce carbon missions (eg renewables) and improve productivity.

Work in this science hub will help ensure that HSE has the science and evidence needed to underpin our policy in key areas across the entire UK industrial asset base, to support HSE's operational activities now and in the future.

Our work will focus on developing our understanding of how materials and structures degrade over time (asset life extension and decommissioning); informing risk-based inspection using non-destructive and autonomous techniques and how designers and manufacturers contribute to improvements in occupational health and safety.

We aim to have improved evidence on the emerging risks from new technologies, advanced manufacturing methods and ageing infrastructure, giving dutyholders and stakeholders a better understanding of their potential impact.

Work in this science hub links to the following key actions in HSE's Business Plan:

- Reduce the likelihood of low-frequency, high-impact catastrophic incidents
- Secure effective management and control of risk

What did we deliver in 2018/19?

- Literature review and experimental work to improve understanding and the advice HSE provides on oil mist detectors – a potential flammable risk mitigation technique in offshore protection systems
- Research on tower crane slewing brakes which was used to inform a revision of the product standard for tower cranes (BS EN 14439:2006) and raise awareness with UK tower crane suppliers and users of slewing brakes and catastrophic collapse

Our priorities for 2019/20

- Support the key elements of leadership, worker involvement, competence and asset integrity across all major hazard sectors
- Focus on decommissioning and ageing infrastructure, and the integrity of new assets and emerging technologies
- Provide scientific support to securing improvement in the effective management of network assets including gas risers in high-rise homes

Our objectives for 2019/20

- Engage with internal and external stakeholders to help facilitate the sharing of learning based on evidence from our applied science and research with those who can influence health and safety improvements
- Create two HSE research topic groups to target the priority areas of decommissioning and dismantling assets, and securing improvements in the effective management of network assets including gas risers in high-rise homes to coordinate, develop and disseminate research that will underpin safety improvements in these areas

Our key projects for delivery 2019/20 and beyond

<i>Flammable atmospheres and thermal effects</i>	The testing of synthetic fire-resistant fluids to determine the effects of degradation	Q4
	Assessment of high-heat flux jet fire test methods	Q2
<i>Plant and machinery</i>	Soft landing systems – an evidence-based review	Q3
<i>Structural integrity</i>	Investigate stainless steel corrosion cracking in offshore assets	2021

Taking responsibility for health at work

Vision: To identify, develop and analyse the evidence base needed to help people in the health and safety system ensure a healthy, productive workforce.

We will commission work under this priority area to identify and develop the evidence necessary for HSE to implement its Health and Work programme, and more widely, to help people in the health and safety system take greater responsibility for health at work.

The Health and Work programme will focus HSE's major efforts on those conditions that are widespread, have life-limiting or life-altering impacts, and with the greatest economic consequences. Stress, musculoskeletal disorders (MSDs) and occupational lung diseases (OLDs) are foremost among these.

Despite these occupational ill-health conditions being extensively researched internationally, significant evidence

gaps remain, particularly regarding the contemporary situation in Great Britain, in respect of practical and effective control measures, and evidence-based evaluations of successful interventions.

The rapidly changing nature of work in Great Britain also means that in the future other health issues, such as ageing workforces, obesity, sedentary behaviour and cardiovascular disease, may become increasingly important.

Work in this science hub area links to the following key actions in HSE's Business Plan:

- Lead and engage with others to improve workplace health and safety

What did we deliver in 2018/19?

- Surveys of standards of control and airborne exposure including:
 - exposure to respirable crystalline silica exposure during demolition;
 - improving intelligence and occupational hygiene control standards in the waste and recycling industry;
 - efficiency of exposure controls for carcinogens during electroplating;
 - wood working; and
 - emissions from 3D printing
- Epidemiological review of GB silicosis cases
- Laboratory evaluation of low-dust control solutions for bakeries
- Selection and use of PPE to protect medical staff against infectious diseases
- Literature reviews of the effectiveness of manual handling training and the use of wearable technologies to monitor and reduce risks of musculoskeletal disorders
- Ergonomic assessments for single-person deliveries and the use of telescopic cleaning poles

Our priorities for 2019/20

- Provide evidence and analysis to support the development, implementation and evaluation of new interventions to tackle priority health risks in support of the Health and Work programme and sector plans
- To expand our collection of health outcome data using digital tools and data-sharing agreements with occupational health providers, dutyholders and other stakeholders
- To further explore the use of wearable technologies to monitor musculoskeletal and other health risks
- To develop a multi-centre study of occupational exposure to respirable dust with automated and remote capture of data using low-cost wireless sensors
- To improve our understanding of the future nature and burden of work-related ill health, taking account of the changing patterns and nature of work, new and emerging risks, and changing demography
- To continue to engage and work with other government departments to share evidence and identify opportunities joint research

Our objectives for 2019/20

- Engage with internal and external experts to undertake a biennial review of occupational health risks
- Co-create three collaborative research proposals with the Thomas Ashton Institute and other external organisations to expand the scope of HSE's health research through the leveraging of wider resources

Our key projects for delivery 19/20 and beyond

<i>Occupation lung disease</i>	Collation and analysis of exposure and health surveillance data on silica-exposed workers	Ongoing
	Longitudinal study exposure and respiratory health in brick manufacturing, foundries and stoneworkers	Ongoing
	Respiratory health risks from processing of natural and artificial stone	Q1
	Occupational hygiene survey of control of diesel engine exhaust emissions in underground mine workings	Q2
	Hydrogen sulphide releases during the stirring of animal slurry	Q2
	Evaluation of new international standards for respiratory protective equipment	Q4
	Dust and bioaerosol exposure in livestock and vegetable farming	Q4
	Ambient levels of asbestos in current workplaces	2020/21
	The use of biological monitoring to evaluate the sustainability of control improvements in electroplating	2020/21
<i>MSDs</i>	Review of MSD risks in construction	Q4
	Assessing the application, use and health risk implications of exoskeletons in GB industry	Q4
<i>Stress</i>	Evaluating workplace interventions that aim to reduce the incidence of work-related stress and improve worker wellbeing	Starting 2019/20
<i>Other health conditions</i>	Occupational health fitness standards for divers	Ongoing
	Current control practice and exposures to noise and hand-arm vibration in the construction industry	Q2

Lessons learned from investigations

Vision: Equip HSE with a lesson learning strategy that makes a tangible contribution to the prevention of death, injury and ill health in GB workplaces.

HSE receives information on around 70 000 reportable health and safety incidents each year and around 4000 of these incidents are subsequently investigated. In addition, our inspectors carry out approximately 20 000 proactive workplace inspections each year, generating intelligence on prevailing working practices and areas of health and safety concern. The potential for us to use these data sources to learn lessons, including why different failures in health and safety occur and how they might be prevented, is substantial.

Recent developments in, and increased use of, data analytic tools and applications, such as text mining, natural language processing, predictive analytics and statistical machine learning, have made the task of generating insights and learning from health and safety data sources, particularly free text sources, more achievable.

The aim of this science hub is to ensure that the generation of lessons learned insights from our routine sources of health and safety data is maximised, and that these are used across HSE and the wider health and

safety community. Benefits will include the development of more effective, targeted risk control strategies and guidance provided to industry. There will be opportunities for us to better engage with, and influence, stakeholder groups, particularly SMEs.

Technical support for investigations, inspections and enforcement

HSE's focus is on the health and safety of workers, but our regulatory interest extends to cover the impact on the general public, consumers and the environment. Of the inspections and investigations undertaken each year, a significant proportion require science or engineering knowledge to identify the causes of problems and to identify reasonable and practicable solutions. We have specialists from over 20 disciplines who provide expert technical knowledge in support of investigations.

Work in this science hub links to the following key actions in HSE's Business Plan:

- Secure effective management and control of risk

What did we deliver in 2018/19?

- Officially launched the Thomas Ashton Institute for Risk and Regulatory Research, in April 2018. This partnership between HSE and the University of Manchester and hub for risk and regulatory excellence, reaches out globally through its educational activities and acts as an authoritative source of health and safety knowledge and expertise
- Set up a five-year 'Discovering Safety' Programme funded by Lloyds Register Foundation which is being delivered through the Institute in conjunction with experts in data science/analytics, artificial intelligence and machine learning, including HSE staff
- Supported regulatory colleagues to improve the timely completion of investigations

Our priorities for 2019/20 and beyond – Lessons learned

- Improve methods of capturing, recording and storing of knowledge generated by investigation activities, maximising the potential to generate wider learning
- Enhance our ability to make full use of the knowledge generated from investigation activities, particularly how it is brought together and synthesised
- Enhance our ability to generate data-driven knowledge, insights and learning from our diverse range of routine health and safety data sources, with emphasis on how it is brought together and analysed
- Enhance our ability to share knowledge, insights and learning, internally and across the wider health and safety system

Our priorities for 2019/20 and beyond – Technical support for investigations, inspections and enforcement

- Sustain improvement in the provision of timely/immediate technical support to incident investigations, anywhere in Great Britain
- Development and deployment of appropriate new techniques and technologies that improve the effectiveness and efficiency of the enforcement process
- Provide specific investigation support and any subsequent enforcement activity including management of evidence and subsequent expert witness input

Work with strategic stakeholders and key partners

HSE’s Shared Research programme supports external investment and collaboration in our research portfolio. This allows resources and expertise to be shared for the benefit of all.

Proposed projects seek to address recognised knowledge gaps that are of interest to both HSE and other stakeholders, to enable us to better understand and manage health and safety challenges.

Through workshops with regulatory, industry and other stakeholders, a consensus focus and approach are agreed and a summary project opportunity document is developed. Partners are then sought to fund the work alongside HSE. Typically, several sponsors

will work with us to ensure that we can undertake a comprehensive programme of work to address the identified requirements.

By supporting the shared research approach, contributing partners will not only be able to help shape the focus of the research activity, but also gain ongoing access to emerging findings and have early sight of outputs.

The programme will benefit further from the skill base of the Thomas Ashton Institute.

Work in this area links to the following key actions in HSE’s Business Plan:

- Lead and engage with others to improve workplace health and safety

What did we deliver in 2018/19?

- Workshops and discussions to develop new ideas for proposed projects on:
 - wearable technologies in the workplace;
 - the safe handling of waste metal powders; and
 - remote visual inspection

Our key projects for delivery 19/20 and beyond

<i>Composites</i>	Integrity of engineered composite repairs on pipework	Ongoing
<i>Escalator safety</i>	Human behaviour and design features	Ongoing
<i>SSHEW</i>	Assessment of slip-resistant footwear for NHS healthcare workers	Ongoing
<i>Bolted joints</i>	Integrity of corroded bolted flanged joints on offshore installations	Ongoing
<i>Flammable mists</i>	Generation of flammable mists from high-flashpoint fluids	Ongoing
<i>Thomas Ashton Institute</i>	Deliver two industry/government/academia engagement events to identify collaborations with new research partners	Q4
<i>New shared research</i>	Deliver two campaigns to widen the reach of our shared research work	Q3

Foresight

HSE’s Foresight Centre will continue to support HSE and the broader health and safety system to anticipate new and emerging health and safety challenges in the workplace that arise from social, economic and technological change.

We will use foresight and futures techniques across a range of themes, to identify and analyse trends and emerging issues, to consider the opportunities and challenges that these may present and their potential to affect workplace health and safety. We

will use the intelligence from this work to inform HSE strategy and future research requirements.

Work undertaken in the Foresight Centre links to the following key action in HSE’s Business Plan:

- Provide an effective regulatory framework
- Lead and engage with others to improve workplace health and safety

What did we deliver in 2018/19

- Presented our annual Foresight Report on the theme of ‘Health’ to the HSE Board, March 2019

Our key projects for delivery 19/20 and beyond

<i>Reporting</i>	Deliver the annual Foresight Report 2019/20	Q4
<i>Engagement</i>	Work with others to address issues and opportunities arising from our foresight and futures activities	Ongoing

Capability and capacity

We continue to develop and maintain our scientific capability and capacity to optimise the contribution science makes to delivering HSE's mission. Development of our staff is aligned with the Government Science and Engineering (GSE) Profession Strategy through:

Achieving Excellence in Science, Engineering and Evidence

This Programme of work aims to provide the environment and professional capability for delivering HSE's Science, Engineering and Evidence (SEE), which aligns with HSE's response to the government's professions strategies.

The programme's themes are:

- **Professional development** – To develop confident, competent scientific professional leadership that provides strong, positive direction and influence on the workplace and inspires and empowers the workforce to achieve the best
- **Pride in our science** – To ensure that we provide the governance and programme environment that enables us to produce robust science, engineering and evidence that underpins both HSE's regulatory activities and supports the commercial agenda
- **Profile** – To determine and undertake the most effective dissemination and engagement approaches to ensure that the data and knowledge generated from our SEE activities is promoted and utilised to best effect

We have a suite of frameworks to support and maintain capability and delivery across the entire breadth of science and technology requirements required by the organisation. The frameworks include:

- **Foresight and horizon scanning** – To ensure HSE's ability to respond proactively to future hazards and risks, this framework will support our futures team in delivering futures work and horizon scanning across the organisation
- **Information and data infrastructure management** – This framework ensures that we effectively manage and maintain science and evidence information and data sources, databases, data repositories and image libraries to ensure they are up to date and can be readily and easily accessed by users
- **Science credibility** – We are committed to ensuring we maintain our reputation and credibility in the delivery of world-class applied science and evidence. This framework supports our membership of national and international scientific expert committees and networks. It supports work to raise the profile of our science and evidence with industry and health and safety professionals
- **Science publication** – This framework supports the production of peer-reviewed journal and conference papers as well as national and international conference presentations
- **Science innovation** – We will support our science teams in exploring novel ideas and activities which need to be undertaken in a short time-frame to maximise potential benefits

- **Emergent health and safety issues** – This framework supports science teams in investigating emergent issues, including shared research opportunities on topics which have arisen unexpectedly and may have consequences for health and safety, and potentially require either regulatory action or further evidence gathering or research

Work in this area links to the following key actions in HSE's Business Plan:

- Enable improvement through efficient and effective delivery

What did we deliver in 2018/19?

- Published over 90 peer-reviewed papers, articles and research reports
- Supported three opportunities for professional capability development

through our Academic Learning Programme, a PhD in Chloride Stress Corrosion Cracking, an MSc in Gas Engineering and Management, and a BEng in Mechanical Engineering

Governance, assurance and engagement

HSE's Science, Engineering and Evidence Assurance Committee, a panel of independent external experts and a sub-committee of the HSE Board, provides assurance to the Board on the quality and relevance of our science and evidence strategy and delivery.

HSE's Research Committee sub-groups, which include independent external experts for each of the science hubs, are providing assurance to HSE's Research Committee of their direction and progress. HSE's Evaluation Committee is independently evaluating the performance and benefits of the science hubs.

HSE's formal, scientific Workplace Health Expert Committee provides expert opinion to our Chief Scientific Adviser and gives HSE access to independent, authoritative, impartial and timely expertise on workplace health.

Publication of our scientific and analytical work in peer-reviewed journals and conference proceedings helps maintain the credibility of our scientific capability, in its capacity to inform and underpin operational regulatory and policy-making functions. Demonstration of science quality is provided by challenge through the courts for expert witness evidence.

HSE's Ethical Statement for science sets out our commitment to the highest possible ethical standards of behaviour and conduct throughout all facets of the work we do,

while meeting all legal requirements. We have a Research Ethics Panel for work involving human tissue, subjects or data which is accredited to the University of Sheffield Medical School Research Ethics Panel (REP). For potentially higher-risk research, we obtain ethical review from either this REP or an NHS REP as appropriate.

We will build understanding of HSE's use of applied science through the dissemination of our annual Science Review, containing case studies of impact. We will advance knowledge of potential emerging risks and issues for health and safety through our annual Foresight Report. We will continue to extend opportunities for further external communications and engagement via digital and social media.

We will engage with stakeholders through involvement in HSE Board and stakeholder events and attendance at conferences. We will also work with appropriate government professions and international scientific networks such as the Partnership for European Research in Occupational Safety and Health ([PEROSH](#)) and the International Commission on Occupational Health ([ICOH](#)).

Work in this area links to the following key actions in HSE's Business Plan:

- Lead and engage with others to improve workplace health and safety

What did we deliver in 2018/19?

- Presented the annual Science Review at the HSE Board meeting, March 2019
- Held the HSE Science Lecture at the Wellcome Collection, April 2018
- Hosted the Suffrage Flag to mark 100 years of votes for some women, October 2018, recognising the contribution of HSE’s women in science, engineering and inspectorate roles
- Supported the government’s 2018 Year of Engineering initiative and featured HSE’s women engineers on International Women in Engineering Day, June 2018

Our priority for 2019/20

- Share the learning from our expert science and research with those who can influence health and safety improvement
- Develop an approach for monitoring and evaluating the impact of HSE science

Our key projects for delivery 19/20 and beyond

<i>Engagement and dissemination</i>	To coincide with British Science Week, publish a series of case stories within the Annual Science Review 2020 which links to HSE’s 2019/20 campaigns	Q4
	Publish 100 research reports, articles, peer-reviewed papers, conference seminars	Q4
<i>Governance</i>	Hold meetings of the HSE Research Committee and related governance groups	Ongoing