

# Science and Evidence Delivery Plan 2020–23



# Foreword

Science, engineering and evidence underpin the work of HSE and provide a basis for robust decision making. It is a requirement for HSE under the Health and Safety at Work 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, largely through our science hubs. Each of these provides a focus for thinking and enables us to consider not just the issues of today, but also how we might address the knowledge gaps to equip us to help reduce risk in the future world of work.

This year has required us to take a more agile approach to our science planning. The COVID-19 pandemic has affected both the need for urgent evidence in this area, and the ability to deliver practical science and engineering activities during the national lockdown period. As a result, we undertook a complete review of our delivery plan, which was developed just before the pandemic emerged.

In addition, we sought urgent requests for ideas concerning the impacts of COVID-19 on HSE’s activities. This exercise resulted in over 120 ideas to fill evidence gaps which we have prioritised and, through the re-planning process, have worked with end-users to develop the science and evidence plan presented in this document.

I am also pleased that for the first time, we have been able to include the evidence needs of colleagues in HSE’s Chemicals Regulation Division and started conversations regarding the evidence needs of the new Building Safety Regulator.

I would like to thank everyone who has helped develop this plan, including the Science, Engineering and Evidence Assurance Committee, who provided helpful views and comments on our approach.

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

# Key objectives for our portfolio of science and evidence work

- Ensure a rolling review against HSE evidence needs to meet evolving regulatory priorities and anticipate the changing world of work, including the new HSE strategy currently under development.
- Create research and development programmes to meet HSE's new needs for the Building Safety Programme and for chemical regulation post-Brexit.
- Build a longer-term science planning cycle which is informed by engaging with stakeholders (nationally and internationally) to understand what HSE needs to do and how we might benefit from working with others.
- Explore opportunities to influence and benefit from Research Council funding, such as gaining invitations to Research Council 'sandpit' meetings in topics key to HSE's needs, jointly applying for funding with other bodies to UK Research and Innovation (UKRI) calls.
- Explore further strategic opportunities for programmes of co-funded research projects that meet HSE's needs.
- Develop a plan of science and engineering activities that address the health and safety risks of current and future places of work.
- Develop a cross-cutting research programme on new and emerging risks.
- Create topic groups in strategic areas to help coordination.
- Understand and prepare for the new world of work post-COVID.
- Create HSE research topic groups in strategic areas to coordinate, develop and disseminate research.
- Develop a proportionate approach for evaluating the impact of science and research on helping Britain work well that includes stakeholder input to the development of benefits and pathways to impact. This approach will ensure that lessons learned during impact evaluations feed into subsequent planning and commissioning of research.
- Publish and refresh HSE's [Areas of Research Interest](#) document<sup>1</sup> with a view to encouraging extramural activity, collaboration and the commissioning of research and development.

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<sup>1</sup> The Cabinet Office required government departments with science interests to publish an ARI to articulate the big research challenges they could not address alone. This has the potential to grow cross-government shared research projects.

# 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 make sure our regulatory framework is fit for purpose. In recent years, HSE has undertaken an extensive review of health and safety regulations and simplified the regulatory framework, making complying with and understanding legislation easier.

We will continue this work, ensuring science, engineering evidence and analysis underpins and contributes significantly 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, new and smarter technologies, health hazards, new uses for old substances and new classes of materials, 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, and learn lessons from international frameworks 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 2019/20?

- Provided analytical support to policy development, including post-implementation reviews (eg the Control of Major Accident Hazards (COMAH) 2015 post-implementation review, the Classification, Labelling and Packaging of Chemicals (Amendments to Secondary Legislation) Regulations 2015 (CLP15) and Construction (Design and Management) Regulations 2015 (CDM 2015), and a cost analysis for introducing new regulation around mild steel welding.
- Initiated programmes of work focusing on the use of new technologies in the workplace. These included a programme investigating the health and safety implications of innovative methods of manufacturing, as well as a programme looking at the use of workplace sensors for health and safety applications.
- Coordinated a collaborative effort between regulators to share data and methods to enhance the targeting and intelligence used in directing regulatory interventions.
- Piloted the use of topic groups in the area of artificial intelligence to identify evidence gaps, develop research ideas and disseminate findings.

## Our priorities for 2020–23

- Continue to support regulatory change following the UK's exit from the European Union, for example by conducting regulatory analysis for implementing the EU transition and Northern Ireland Protocol.
- Understand and develop necessary changes to the regulatory framework post-COVID and in the transition to the new working environment.
- Support the establishment of the new Building Safety Regulator through providing evidence for the impact assessment, establishing an operational dataset and building an analytical function for the new regulator.
- Further develop the use of our evidence base to inform future regulatory approaches to ensure serious risks are diagnosed and proportionate action is taken.
- Through initiatives 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 to 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 opportunities that will help us understand the role of technology in supporting our regulatory framework. This will range from exploring trends and drivers for change in regulatory

approaches, to enhancing our regulatory functions through use of technology such as artificial intelligence and the Internet of Things.

- Further develop our understanding of advanced manufacturing to enable safe adoption of these techniques in the UK. This means we will progress additional science and evidence to support a robust regulatory framework, where required.
- Develop collaborative research in artificial intelligence and autonomy. This will build on expertise across academia and industry, with a clear focus on the health and safety implications of this rapidly advancing technology.

### **Our key projects for delivery 2020–23 and beyond**

<i>Impact and analysis</i>	<p>Provide analytical support to policy development, including impact assessments and post-implementation reviews.</p> <p>Support regulatory change following the UK’s exit from the European Union.</p> <p>Provide analytical support to the new Building Safety Regulator.</p>
<i>Machinery controls</i>	<p>Provide insight about emerging technologies in the field of machinery controls to inform future HSE policy and guidance.</p>
<i>Workplace sensors</i>	<p>Develop the evidence to support appropriate use of workplace sensors to enable effective health and safety management, research and regulation.</p>
<i>Advanced manufacturing</i>	<p>Investigate the health and safety implications of innovative methods of manufacturing.</p>
<i>Recirculating local exhaust ventilation (LEV)</i>	<p>Review current evidence around the effectiveness of recirculating systems of exhaust ventilation for managing exposure risks.</p>
<i>The new workplace</i>	<p>Understand transmission pathways and develop the technologies and regulatory frameworks for the new working environment.</p>

# The right evidence for the future

## Vision

**To take a long-term view on developing 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 ongoing updates to reflect the rapid and complex changes in the workplace, workforce, working patterns and working environment and, as a result, the changes in HSE's priorities and intervention strategies. To ensure our evidence-gathering systems continue to be effective and efficient – not just fit for current priorities and intervention strategies, but 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 advances in measurement science and technology to improve evidence gathering. We will make best use of new data collection, data-mining, modelling and analytical techniques to provide insight for our decisions on prioritisation, targeted intervention, tracking progress and evaluating impact. We will, where appropriate, 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 2019/20?**

- Published a comprehensive suite of health and safety statistics, to time and quality standards and with enhanced presentation.
- Informed by our Measuring Strategy, implemented a coordinated, consistent approach to measurement to assess the impact of the Health and Work Programme, and made this approach visible nationally and internationally.
- Completed several projects to improve HSE's evidence base for effective risk management in areas of explosives and pyrotechnic articles placed on the market, fairground rides, workplace exposure to respirable crystalline silica (RCS), and health and safety in construction.

## **Our priorities for 2020–23**

- Coordinate delivery of the measurement plans and ensure this 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 identifying 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 2020–23**

- 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.
- Map activities against our Measuring Strategy framework, using the health and work programme as a model, to ensure we have the appropriate mix of measures to assess the impact of the programme and its key interventions.

**Our key projects for delivery 2020–23 and beyond will include**

<i>National statistics</i>	Publish a suite of health and safety statistics.
<i>Monitoring and evaluation of interventions</i>	<p>Implement the Measuring Strategy with the Health and Work Programme.</p> <p>A longitudinal survey of employers and employees to measure changes in awareness, behaviours and control measures.</p> <p>Map activities against the Measuring Strategy framework to ensure we have the appropriate mix of measures to assess the impact of the Health and Work Programme and its key interventions.</p>
<i>Data collection</i>	<p>Capture workplace exposure-control intelligence from health-related inspection visits.</p> <p>Manage and further develop the National Exposure Database.</p> <p>Data archiving for science.</p>
<i>Measurement science and technology</i>	<p>The application of next-generation gene sequencing to support health impact assessment after workplace exposure to microorganisms.</p> <p>Ensure better isocyanate exposure assessment to better protect health at work.</p> <p>Improve measurements of occupational exposures to metals hazardous to health for effective risk control.</p> <p>Improve the measurement of occupational exposure to respirable crystalline silica.</p>
<i>Modelling and risk assessment</i>	<p>Optimise offshore working patterns.</p> <p>Develop and maintain risk assessment models and guidance for land-use planning.</p> <p>HSE’s modelling for predicting chlorine dispersion in the ‘Jack Rabbit II’ experiments to provide the right evidence base for land-use planning.</p> <p>Analysis and refinement of the model for predicting herbicide concentrations.</p>
<i>Methodology</i>	<p>Develop an occupational exposure-control intelligence system in Great Britain, using respirable crystalline silica as an example – a feasibility study.</p> <p>Turning the Risk Profile in Construction project into an intervention – a feasibility study.</p>

# 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 is how to manage the risks from changes in the demographic profile of Great Britain's workforce. The aim of this science hub is 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). However, 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.

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. In addition, dutyholders will be better prepared and use appropriate interventions and solutions to manage demographic risks.

Initial work identified ten areas with gaps in demographics knowledge and evidence:

- understanding and managing extended working lives;
- understanding and managing social inequalities within the workforce;

- 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;
- understanding and managing communication and engagement in the future workforce.

These 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 has begun and will continue to 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 2019/20?**

- Continued to engage widely – externally with academia, industry, other government departments and others to discuss collaboration, funding and potential to deliver joint research – and internally within HSE, engaging across sectors and divisions on cross-cutting topics such as the ageing workforce and new ways of working.
- Took part in HSE's science planning process – helping to plan and contributing to delivery of workshops, analysing workshop outputs and identifying demographic priority research arising from those workshops.
- Completed project initiation documents, ready for consideration by HSE's Research Committee, to take forward a programme of work on managing health and safety risks from extended working lives.
- Published our report on the [gig economy](#).
- Continued our collaboration with the University of Manchester to improve our understanding of the health of professional drivers. This included a workshop to explore options for future research, and submitting two joint bids for funding (under the Industrial Strategy Grand Challenge fund for ageing, and UKRI Medical Research Council).

## **Our priorities for 2020–23**

- Begin delivering the extended working lives programme.
- Undertake work to identify how to take the findings from the gig economy report forward – including setting up a gig economy topic group and carrying out a Delphi exercise to test potential ways forward.
- Continue to set up and deliver collaborative work with the University of Manchester and others as part of the Thomas Ashton Institute.
- Continue engagement activity both within HSE and with external stakeholders to develop and deliver collaborative research that increases the existing body of demographics knowledge, and improves understanding about the impact of demographic change on workplace health and safety.
- Continue using evidence generated from demographics foresight activity to anticipate and keep pace with demographic change and identify potential implications for HSE.
- Continue monitoring demographic research undertaken by others, and review our gaps in knowledge and evidence about the impact of demographic change on the health and safety of the future workforce.

## **Key projects for delivery 2020–23 and beyond will include**

- Explore the feasibility of undertaking a study to build a numerical ‘picture’ of extended working lives.
- Understand changes in risk attitudes and behaviours and health across extended working lives.
- Gain information to better understand how to influence employers’ attitudes and behaviours with respect to designing and adapting the workplace (including managing chronic health conditions) over extended working lives.
- Understand the difference made by ‘good’ practices for managing the health and safety of older workers, enabling early intervention and understanding what makes the biggest difference.
- Develop a health and safety culture excellence assessment process which will include physical and psychological health as well as safety.
- Understand the effects of workforce diversity on the nature of the workplace post-COVID-19.

# The right intervention strategy for the British industrial asset base

## Vision

**To have effective intervention strategies that enable innovation within 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. These include 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 its 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, reduce carbon emissions (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 2019/20?

- Published our completed work on the assessment of toxic risks from warehouse fires.
- Published progress on our experimental research on potential confined ignition sources for vapour cloud explosions, including explosions in electrical control boxes.
- Published a review of recent incidents involving flammable mists.

### Our priorities for 2020–23

- 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 key projects for delivery 2020–23 and beyond will include

<i>Flammable atmospheres and thermal effects</i>	The testing of synthetic fire-resistant fluids to determine the effects of degradation. Factors affecting the severity of vapour cloud explosions.
<i>Structural integrity</i>	Investigate stainless steel corrosion cracking in offshore assets.

# 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 those 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 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 action in HSE's Business Plan:

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

## What did we deliver in 2019/20?

- A study comparing emissions of silica and dust from processing artificial and natural stones.
- An assessment of exposure to respirable crystalline silica during manual splitting and dressing of slate leading; updated COSHH Essentials guidance informed by this research was also published.
- An epidemiological review of UK silicosis cases reported through a UK surveillance scheme 1996-2017.

- Evaluation of existing personal protective equipment (PPE) worn by NHS staff for assessment of a patient with a suspected high-consequence infectious disease.<sup>2</sup>
- An ergonomics study of the minimum space requirement for removal of asbestos insulating board ceiling tiles.
- A review of future developments in human performance enhancement and risk reduction for MSDs.
- Organised an international workshop with members of the PEROSH network of European health and safety research establishments to exchange information on national approaches, evidence sources and evidence gaps relating to managing work-related stress, mental health and wellbeing in the workplace.
- We continued to engage widely with academia, industry and others to discuss collaboration, funding and potential to deliver joint research.

### **Our priorities for 2020–23**

- 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.
- Expand our collection of exposure and health outcome data using digital tools and data-sharing agreements with occupational health providers, dutyholders and other stakeholders. These data, along with similar data gathered through targeted workplace surveys, will contribute to HSE's measuring plans for occupational health.
- Continue 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.
- Continue monitoring occupational health research being undertaken by others and identify the potential policy or operational implications of such research for HSE.
- Continue to engage and work with other government departments to share evidence and identify opportunities for joint research.

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**2** This evaluation did not specifically relate to Coronavirus.

**Our key projects for delivery 2020–23 and beyond will include**

<p><i>Occupational lung disease</i></p>	<p>Longitudinal study of exposure and respiratory health in brick manufacturing, foundries and stone workers.</p> <p>The use of biological monitoring to evaluate the sustainability of control improvements in electroplating.</p> <p>Ambient levels of asbestos in current workplaces.</p> <p>Evaluation of rapid test methods for detection of Legionella in industrial cooling water systems.</p>
<p><i>MSDs</i></p>	<p>Assessing the application and use of exoskeletons.</p> <p>Review of MSD risks in construction.</p>
<p><i>Stress</i></p>	<p>Understanding what motivates dutyholders to undertake risk assessments for work-related stress and implement appropriate interventions and the factors that help or hinder them in this process.</p>
<p><i>Other health conditions</i></p>	<p>Current control practice and exposures to noise and hand-arm vibration in the construction industry.</p> <p>Survey of health surveillance provision in construction.</p> <p>Operator exposure during application of pesticides to tunnel-grown crops and herbicides applied through weed wipers.</p> <p>Occupational health fitness standards for divers.</p> <p>Virtual population disease modelling of chronic occupational ill-health conditions.</p> <p>Economic valuations of the benefits of health and safety interventions and investments: updated values of a prevented fatality (VPF), life year (VOLY) and quality-adjusted life year (QALY).</p>

# 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 British workplaces.**

HSE receives information on around 70 000 reportable health and safety incidents each year, and about 4000 of these incidents are subsequently investigated. In addition, our inspectors carry out around 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 data-driven insights and learning from health and safety data sources, particularly free text sources, more achievable.

The aim of this science hub is to maximise the generation of lessons learned insights from our routine sources of health and safety data, and use these lessons 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 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 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 action in HSE's Business Plan:

- Secure effective management and control of risk.

## What did we deliver in 2019/20?

- Supported regulatory colleagues to improve the timely completion of investigations. These included:
  - Specialists at HSE's Science and Research Centre led the integral mathematical consequence modelling of hydrocarbon release from an offshore well blowout. This work supported HSE's case for prosecution.
  - HSE engineers provided robust scientific evidence to the court for an incident investigation following the death of a child in a disability lift. This resulted in a successful prosecution.
  - An investigation team from across HSE worked diligently over eight-and-a-half years on the incident which took place on 2 June 2011 at the Chevron Pembroke site that killed four people and left another with life-changing injuries. The company was prosecuted, and the judge passed sentence in June 2019. An [overview of the incident and underlying causes](#) of the explosion in the amine regeneration unit has been published on HSE's website.

## Our priorities for 2020–23 – Lessons learned

- Improve methods of capturing, recording and storing 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 2020–23 – Technical support for investigations, inspections and enforcement

- Sustain improvement in the provision of timely/immediate technical support to incident investigations, anywhere in Great Britain.
- Develop and deploy 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.

# Science and evidence needed to underpin HSE's work as a result of COVID-19

## Vision

**Development of the science and evidence which will underpin HSE's understanding and response during the current pandemic and in the future world of work post-COVID-19.**

As a result of the COVID-19 pandemic, the world has experienced disruption on a scale not seen since World War Two. People, systems, processes and procedures have had to adapt rapidly to cope with the challenge the virus has presented. In the aftermath of this event, significant change to how we think, function and operate is likely to be apparent, and we need to understand how this will impact the future world of work post-COVID-19.

To support the government's response to the COVID-19 pandemic, the Chief Scientific Adviser's office ran an internal 'Competition of Ideas' to identify HSE's science and evidence requirements. A set of themes or thought starters were used to facilitate this, informed by horizon-scanning activities conducted by our Foresight Centre.

The response to this call was unprecedented, with over 120 ideas identified. The ideas have been assessed against the following general criteria:

- ability to fill evidence gap in support of HSE's COVID-19 response;
- ability to fill evidence gap using data/information held only by HSE;
- urgency for evidence;
- uniqueness (work not identified as part of another funded programme, eg UKRI);
- opportunity for funding as shared research;
- opportunity to join existing work funded by others.

Around 50 of these ideas have been identified as time-critical work packages that are needed to support the current pandemic and these will be our priority. Given the national (and international) efforts and interest in this work, we also intend to work with others through, for example, national programmes and other appropriate means.

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

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

Our work will focus on the following key themes:

- Quantified risk assessment and understanding the pathways for workplace transmission.
- Use and efficacy of PPE, respiratory protective equipment (RPE) and engineering controls in the workplace.
- The impact of the COVID-19 pandemic on health and safety management in high-hazard industries.
- Occupational health consequences of the COVID-19 pandemic, particularly in relation to the potential impacts of changes in work practices such as remote working on mental health and musculoskeletal disorders.
- Factors influencing a successful return to work and the leadership required to manage the post-COVID-19 workforce.

### **Our priorities for 2020–23**

Our complete portfolio of work is still being developed, but we anticipate that some of the key projects will be:

- Assessing transmission of COVID-19 in the workplace, including mitigation of risks for infection.
- Coughing in asymptomatic or pre-symptomatic carriers and the spread of COVID-19.
- Performance of respiratory protective equipment after decontamination.
- The use of positioning technologies to support physical distancing measures in workplaces.
- A risk-based heat map – identifying areas where workplace infection risk of COVID-19 could be high in England.
- Developing and applying an agent-based model for workplace transmission of COVID-19.
- How to identify workplace outbreak clusters – what to measure when you do, and how to collate/analyse such data.
- Localised ventilation controls to reduce the risk of COVID-19 transmission.
- Investigating the role of indoor ventilation on the potential spread of COVID-19.
- Measure whether certain aspects of workplace environments, or controls put in place for COVID-19, significantly affect the potential for transmission.
- Develop qualitative and quantitative risk assessment methodologies to assess COVID-19 control measures' effectiveness.

Some of the projects within the portfolio will be included in a new national programme of research which is currently being developed.

# Enabling society to benefit from the appropriate regulation of chemicals

## **Vision**

**Appropriate and proportionate regulation of chemicals – enabling society to derive the benefits of access to products while protecting people’s health and avoiding unacceptable environmental impacts.**

HSE’s Chemicals Regulation Division operates a number of regimes relating to the classification, registration and trade in chemicals (with certain regimes focusing on particular classes of chemicals). The programme of work in this science hub aims to optimise the regulation of chemicals, ensuring that our regulatory regimes and other processes are based on an up-to-date understanding of scientific, technical and other information.

Research in this hub will be developed to help understand how well existing regulatory frameworks reflect current understanding, insight, practices (such as those driven by new technologies) and factors such as a changing environment. The research will largely focus on improving the efficiency and effectiveness of regulatory regimes and processes. We aim to 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 actions in HSE’s Business Plan:

- Provide an effective regulatory framework.
- Secure effective management and control of risk.
- Contribute to government-wide activities on the UK’s departure from the EU.
- Operate effective statutory schemes, ensuring the safe use of potentially harmful substances.

## **Our priorities for 2020–23**

- Develop a strategic approach to identifying and prioritising R&D/Evidence needs.
- Ensure the UK seizes the opportunity afforded by our exit from the EU to develop a more agile/‘smarter’ approach to chemicals regulation.
- Enhance approaches to human health and environmental risk assessment, reducing areas of uncertainty.
- Promote the more sustainable use of chemicals by improving understanding of pest resistance.
- Test assumptions made in modelling processes used in risk assessment and improve our understanding of the way products are used.
- Through concepts such as the Regulatory Intelligence Hub, develop links between different parts of HSE and other regulators where data and intelligence can be shared to improve efficiency and effectiveness.
- Develop relationships with research organisations to bid for funds for research projects that will develop practical solutions to managing chemicals and their interaction with the environment.
- Work with independent science-based research organisations and others to maximise opportunities to keep the regulatory framework up-to-date and fit-for-purpose. This will range from exploring trends and drivers for change in regulatory approaches, to formalising specific requirements.

# Work with strategic stakeholders and key partners

HSE's Shared Research Programme supports external investment and collaboration in our research portfolio to address areas of research interest (ARIs). This allows resources and expertise to be shared for the benefit of all.

Proposed projects seek to address recognised knowledge gaps within ARIs that are important 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 not only 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 action in HSE's Business Plan:

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

## What did we deliver in 2019/20?

- Integrity of engineered composite repairs on pipework. Reports from the work will be made openly available in the future.
- An assessment of slip-resistant footwear for NHS healthcare workers. The report will be published by the [National Institute for Health Research](#) (NIHR).

**Our key projects for delivery 2020–23 and beyond will include**

<i>Escalator safety</i>	Human behaviour and design features.
<i>Bolted joints</i>	Integrity of corroded bolted flanged joints on offshore installations.
<i>Flammable mists</i>	Generation of flammable mists from high-flashpoint fluids.
<i>Remote visual inspection</i>	Consideration of the role and value of remote inspection techniques.
<i>HyTunnel-CS</i>	Work to consider the safety of hydrogen-driven vehicles and transport through tunnels/confined spaces.
<i>Wearables</i>	Validate the use of the technologies for workplace health and safety.
<i>Thomas Ashton Institute</i>	Deliver two industry/government/academia engagement events to identify collaborations with new research partners.
<i>New shared research</i>	Deliver two campaigns to widen the reach of our shared research work.

# Foresight

Changes within the workplace and workforce are ongoing. Many factors are driving these changes and shaping the future world of work.

Our Foresight Centre will continue to support HSE and the broader health and safety system to anticipate and keep pace with these changes and be better placed to tackle new health and safety challenges. It will fulfil its core foresight, futures and knowledge-sharing functions by identifying potential threats, risks, emerging issues and opportunities for the health and safety system.

We will identify and monitor trends that are shaping the future world of work, so that potential health and safety issues can be considered early – demonstrating that the health and safety system is an enabler of innovation and contributor to the UK's industrial strategy.

We will continue to carry out foresight and futures activities and identify change across a range of broad areas, including societal, technical, economic, environmental and political, in order to identify issues with potential for impact on occupational health and safety. This intelligence will be used to inform strategy, our areas of research interest and future research requirements.

Work undertaken in the Foresight Centre links to the following key actions 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 2019/20?**

- Presented our annual Foresight Report, on the changing nature of work, to the HSE Board.
- Produced our foresight strategic plan, linking foresight activities to intended benefits and impacts.
- Delivered a series of workshop presentations to provide foresight input and a forward-looking perspective into HSE science planning.
- Prepared and presented a paper to the HSE Research Committee on gathering foresight evidence to inform HSE's measuring strategy.
- Produced and disseminated regular internal communications and sector-focused information, to raise awareness of sector-specific issues and enable HSE colleagues to keep pace with change in the world of work.

**Our key projects for delivery 2020–23 and beyond will include**

Reporting	Deliver the annual Foresight Report. Deliver evidence to inform HSE’s measuring strategy. Deliver information on the benefits and impacts from foresight activity.
Engagement	Communicate and engage widely with key stakeholders to consider challenges and opportunities arising from our foresight and futures activities. Engage with associates and begin to develop foresight skills across the wider HSE.

# 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 relevant Government Profession Strategies through:

## **ASPIRE – Science Excellence Programme**

This programme of work aims to provide the environment and professional capability for delivering HSE's Science, Engineering and Evidence (SEE).

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 we provide the governance and programme environment that enables us to produce robust science, engineering and evidence to underpin HSE's regulatory activities and support the commercial agenda.
- *Profile* – To determine and undertake the most effective dissemination and engagement approaches to ensure the data and knowledge generated from our SEE activities are promoted and used to best effect.

We manage and develop the capabilities of our staff and facilities we invest in:

- staff – in their knowledge and skills to ensure we have the capability to meet current and emerging science and evidence needs;
- new facilities, techniques and technologies, and maintain facilities unique to HSE to meet the organisation's current and emerging needs;
- information and knowledge management to ensure the full value of this important asset can be released.

Our scientists demonstrate important values and behaviours. They:

- keep up to date, anticipating new challenges from workplaces and research;
- are innovative, ethical, professional, methodical, focus on quality and demonstrate curiosity;
- use their knowledge and skills to solve problems for end-users in the real world of work.

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

- Enable improvement through efficient and effective delivery.

### **What did we deliver in 2019/20?**

- Joined and became fully active within the STEM Futures Partnership (with government, academia and industrial partners) and its technical hubs, to provide an easy mechanism for developing technical skills, knowledge and experience through on-the-job learning via placements or secondments, potentially supplemented by further education.
- Contributed to the development of the government Science and Engineering (GSE) Career Framework and the further refinement and development of apprenticeship offerings.
- Supported professional capability development through our Academic Learning Programme.

### **Our priorities for 2020–23**

- Champion the GSE Career Framework for our GSE staff.
- Contribute to the development of the GSE skills assessment tool.
- Support further professional capability development through our Academic Learning Programme and the STEM Futures Partnership.

# 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 HSE Board on the relevance and quality of our science and evidence strategy and delivery. HSE's science governance processes are underpinned by science hub governance groups providing oversight and prioritisation of research. A new Science, Evidence and Research Advisory Group has been established which enables the Chief Scientific Adviser to ensure that the research activity commissioned for HSE end-users is aligned to HSE's strategy and plans.

HSE's Workplace Health Expert Committee, a formal scientific 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. The quality of our science is also demonstrated 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), while for potentially higher-risk research, we obtain ethical review from either this REP or an NHS REP, as appropriate.

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

We engage with stakeholders through involvement in HSE Board and stakeholder events and attending conferences. We 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 action in HSE's Business Plan:

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

### **What did we deliver in 2019/20?**

- Delivered a successful 'All Science Hub' stakeholder event – October 2019.
- Completed the first stage of work to develop an approach for monitoring and evaluating the impact of HSE science – December 2019.
- Presented the annual Science Review 2020 at the HSE Board meeting – March 2020.
- Over 100 science and analysis publications (research reports, national statistics, articles in trade and professional magazines, book chapters and articles etc in peer-reviewed journals and conference proceedings).
- Launched a Twitter feed for HSE's Chief Scientific Adviser @CSA\_HSE.

### **Our priorities for 2020–23**

- Develop our external science communications social media approach.
- Using our enhanced external science communication channels, share learning from our expert science and research with those who can influence health and safety improvement.
- Deliver an HSE Science Conference for HSE's Government Science and Engineering staff.

**Our key projects for delivery 2020–23 and beyond will include**

<i>Engagement and dissemination</i>	<p>To coincide with British Science Week, publish a series of case stories within the Annual Science Reviews 2020–23 which links to HSE’s annual campaigns.</p> <p>Over 100 science and analysis publications per year (research reports, national statistics, articles in trade and professional magazines, book chapters and articles etc in peer-reviewed journals and conference proceedings).</p> <p>Deliver annual HSE Science Lecture.</p> <p>Collaborate with the Thomas Ashton Institute in delivering the Ashton lecture.</p>
<i>Governance</i>	<p>Continue to hold meetings of HSE’s external and internal science governance groups.</p>