

Draft

**HSC Science Strategy
2005 - 2008**

**Gathering Evidence; Developing Understanding;
Identifying Solutions**

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Preface by Chair of the Health and Safety Commission

In February 2004, the Commission published the new HSC Strategy, *A Strategy for Workplace Health and Safety in Great Britain to 2010 and beyond*.

The strategy has committed the Commission and HSE, working with Local Authorities, to build on past success in industrial safety by opening a new front to bring about equally substantial improvements to occupational health, to develop partnerships with other authorities and hard to reach organisations, and to bring the benefits of good occupational health and safety practice to people working in economic sectors overseen by Local Authorities. This HSC Science Strategy sets out how HSE will apply science to the delivery of this commitment and to the realisation of our targets.

Properly targeted expenditure on research for policymaking and operational support offers exceptionally good value for money. It provides solid evidence for policy development and delivery and for operational activities; it can prevent flawed policies and initiatives from proceeding and money being wasted.

I commend this science strategy to you, and look forward to your views and comments.

Bill Callaghan

HSC Science Strategy 2005 - 2008

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Foreword by the Chief Scientist

The application of science and engineering knowledge has always been a key component in delivering HSE's mission. HSE uses its scientists, engineers and the research it funds to understand problems and develop effective practical solutions for a wide range of workplaces, from the complex technologies used in major industrial sectors, (e.g. nuclear and chemical industries) through to the problems faced by individual workers, (e.g. falling from heights and stress). Science and engineering provides HSE with evidence on the causes of ill-health and incidents in the workplace; it influences where our priorities lie; and it contributes to developing solutions to control a range of workplace risks.

In February 2004, the Health and Safety Commission published '*A strategy for workplace health and safety in Great Britain to 2010 and beyond*'. This strategy aims to tackle the challenge of making health and safety risk management relevant to the modern and changing world. It does this by concentrating on four strategic themes, including a greater focus on occupational health issues and increasing involvement with stakeholders. The strategy is for the whole of the GB health and safety system. HSE will deliver its contribution through Strategic Programmes, which will help focus our efforts where they will have most impact.

HSE's science and engineering resources will make a critical contribution to this work. This strategy describes the principles HSE applies in the use of science and sets out how HSE plans to use its science and engineering resources to address the challenge of delivering the new HSC Strategy.

This science strategy will develop as circumstances and our understanding change. As such, it will be a 'living' document to be refined and updated. I would be pleased to receive comments on our approach or progress at any time.

Paul Davies
Chief Scientist

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1 Executive Summary

To be added following consultation on this draft strategy

HSC Science Strategy 2005 - 2008

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2 Introduction

In February 2004, the HSC launched a new strategy for health and safety to 2010 and beyond¹, with the vision - to gain recognition of health and safety as a cornerstone of a civilised society and, with that, to achieve a record of workplace health and safety that leads the world. This Science Strategy 2005-08 sets out how HSE will apply science and engineering to help deliver the Commission's mission to protect people's health and safety by ensuring that risks in the changing workplace are properly controlled. This includes achieving improvements in health and safety performance, especially the delivery of the *Revitalising Health and Safety (RHS)* targets by 2010; to cut deaths and major injury accidents by 10%; reduce the rate of work-related ill health by 20%; and cut working days lost due to health and safety failure by 30%.

HSE will deliver its contribution to the HSC Strategy primarily through five Strategic Programmes (SPs) - Major Hazards, Sectors, Health and Safety Hazards, Local Authority Partnership and Better Health at Work Partnership. HSE's science provides an essential, broadly based foundation to deliver its Strategic Programmes.

HSE, in partnership with the Local Authorities (LAs), regulates workplace health and safety. Its business is heavily science based, dealing as it does with a wide range of workplaces and industry sectors, often with complex technical issues to be regulated. HSE has a first rate scientific staff, with around 780 in-house specialists, covering a very broad range of specialisms. These range from the traditional engineering professions (e.g. mechanical and electrical control engineers) through occupational health specialists (including doctors, nurses and occupational hygienists), statisticians, economists and social scientists to highly specialised staff/ inspectors (including offshore well engineers and nuclear criticality experts). HSE staff are supported by the Health and Safety Laboratory (HSL) and commissioned science projects. This mix of in-house and contracted science supports policy development and the delivery of our statutory functions. In addition to delivering the SPs, it contributes to:

- Investigating incidents and complaints;
- Delivering statutory schemes, e.g. asbestos licensing;
- Positioning HSE's capabilities to respond to future H&S issues arising from industrial innovation, e.g. horizon scanning, developing the evidence base and understanding the impact of its interventions.

¹ A strategy for workplace health and safety in Great Britain to 2010 and beyond. Available through the HSE website at: <http://www.hse.gov.uk/aboutus/hsc/strategy.htm>

HSE draws on a wide community of scientific expertise (including academics, consultants, workers, the public) to gather evidence, develop understanding – including peer review, and identify solutions.

3 Principles for the Strategic Use of Science in HSE

The delivery of HSC’s vision and mission for health and safety demands HSE’s strategic use of science according to the following principles.

HSE will:

- Use science solely to deliver its strategic business priorities, with a strong focus on health and human and organisational behaviour, ensuring that money and resources are targeted at the delivery of the strategic priorities.
- Use its scientific resources flexibly to meet its changing business needs, including making more use of external contractors where that provides better value for money.
- Contribute to the development of Government science policy and apply it to all its work.
- Improve the linkages between science, policy and delivery and to promote a better collaboration between scientists, policy makers and deliverers.
- Use its in-house resource, supported by external expertise where appropriate, to deliver its regulatory functions and contribute to the evidence base for the development of policy. This will be achieved through three levels of application of science:
 - Front line work (e.g. incident investigation; inspection; safety case and report assessment)
 - To aid/ stimulate industry-focused activity (e.g. industry specific standards & guidance)
 - Cross-cutting activity (e.g. horizon scanning; generic guidance)
- Continue to commission science in accordance with the arrangements and principles in Appendix 1 and apply research:
 - Where independent advice is required by HSE on the extent and nature of the risks involved
 - Where there is a need for informed HSE participation in national and international standards making
 - Where information is needed in the light of incident experience or to support specific enforcement activities or policy initiatives
 - Where projects, though with clear health and safety benefits are too risky for firms to go ahead with themselves; for example, when timescales are long and/or the technical risks are high
 - When the particular part of industry lacks the relevant scientific and technological expertise

- When entry costs are high for manufacturers of safety-related equipment and the industry is small and fragmented
 - Where industry is complacent or uninnovative and requires the stimulus and competition of new ideas to encourage improvement
 - When the potential beneficiaries are too diffuse for any one company to undertake the research on its own or the availability of results will be restricted
- Provide support for HSE’s regulatory activities through the commissioning of scientific support, with HSL as primary supplier to:
 - Understand the causes of incidents and ill-health;
 - Propose remedial measures;
 - Contribute to the evidence base to develop and deliver its priorities and programmes;
 - Make the knowledge gained widely available
 - Have regard to, and use, relevant science activities in GB and internationally. Where appropriate, HSE will seek opportunities to collaborate with others.
 - Make publicly available information on our science programmes subject to over-riding considerations for national security and/or HSE’s intellectual property policy.²

4 Contribution to Strategic Themes

HSE will use science to provide a proper evidence base for the delivery of the strategic themes and priorities arising from the HSC Strategy. The contribution that science will make to the delivery of the strategic themes is shown in Table 1.

Table 1: Science contribution to the strategic themes and key points from the HSC Strategy, *A Strategy for Workplace Health and Safety in Great Britain to 2010 and beyond*

Strategic themes and key points	Science contribution
<p>Developing closer partnerships</p> <p>Working through others – we want to give full recognition to the contribution of a properly designed and executed health and safety system to the broader agenda and to utilise the contribution of others to our aims.</p> <p>HSE and LAs working together – we have looked closely at the current division of enforcement responsibility between LAs and HSE and their ways of working and wish to see HSE and LAs work in a closer partnership based on a mutual understanding of the value of local versus central intervention.</p>	<p>Be aware of the relevant science activities of others and increase collaborative working, particularly through joint projects with stakeholders.</p> <p>Provide improved support to LAs using our internal resource and through use of research. Increase support for research into new ways of working, and better evaluation of existing forms of intervention.</p>

² www.hse.gov.uk/research/ipright.pdf

Strategic themes and key points	Science contribution
<p>Developing closer partnerships (cont.)</p> <p>Rising to the challenge of occupational health – significant advances have been made in pressing down on the causes of safety failures using existing tools and methods, but leverage on health issues will require new methods.</p>	<p>Increase the proportion of research and focus more internal resource on health issues. Establish and renew partnerships with new and existing stakeholders including DWP, DoH and NHS. Use our science resource to engage and catalyse the GB’s occupational health community in support of the establishment of a new occupational health support system. Develop a new national Workplace Health and Safety Survey.</p>
<p>Helping people to benefit from effective health and safety management and a sensible health and safety culture</p> <p>Understanding the benefits of health and safety – Some businesses, particularly small ones, perceive HSE as an organisation of experts, talking to experts and devising approaches and guidance for the same experts. We need to do more to make health and safety and its benefits more widely understood and accepted</p> <p>Involving the workforce – an organisation’s greatest asset is its workforce. We need to expand the base of employee involvement in health and safety management to cover the whole workforce</p> <p>Providing accessible advice and support – our consultations show that some businesses, particularly small businesses, say they want to comply with health and safety standards, but are fearful of approaching HSE or LAs for advice. We want to develop channels of support and advice that can be accessed without fear of enforcement action while allowing the regulators to continue to be tough on those who wilfully disregard the law.</p>	<p>Use our science resources to communicate the moral, social and economic benefits of health and safety working with our new Social Science Unit and Communications Directorate.</p> <p>Exploit previous and ongoing research into promoting worker involvement in health and safety through the use of safety management and culture, including worker safety advisors.</p> <p>Fully assess HSE/others’ previous and existing best practice for dissemination activities. Work with others to encourage them to produce good practice information sources. Use science resources to focus on improving relevance, availability and usability of the advice we produce.</p>
<p>Focussing on our core business and the right interventions where we are best placed to reduce workplace injury and ill health</p> <p>Being clear about our priorities– The Health and Safety at Work etc Act can be construed very broadly and, as our consultations have shown, stakeholders frequently want us to do more than we are able. Even with increased efficiency, HSE and LAs will not be able to meet these demands and they must manage their priorities rigorously.</p>	<p>Improve the evidence base on the best way to target HSE and LA resources to achieve the greatest impact.</p> <p>HSE will continue to apply its unique expertise to provide public assurance that risks in the major hazards industries are properly managed.</p>

Strategic themes and key points	Science contribution
<p>Focussing on our core business and the right interventions where we are best placed to reduce workplace injury and ill health (cont.)</p> <p>An interventions strategy – acceptable health and safety standards can be achieved in many ways. HSE and LA’s will do more to identify the value of their impact and to trust the impact of others.</p> <p>Continuing to enforce where appropriate – enforcement or the fear of enforcement is an important motivator for some employers. Our evidence confirms that enforcement is an effective means of securing compliance and promoting self-compliance, but too many deaths and major injuries result from simple failures. This is, and will remain, unacceptable.</p>	<p>Evaluate the impact of existing HSE and LA interventions and capture the views, knowledge and experience of HSE and LA practitioners. With others, develop an improved intervention strategy, implement it and evaluate its impact.</p> <p>HSE will continue to work to prevent incidents from those industries which have the potential to cause significant harm, including to members of the public, such as the chemical, offshore, nuclear and railways industries and to maintain our international obligations. HSE will review its safety case regimes to ensure that they remain relevant and proportionate to the changing nature of these industries in Great Britain. This work has already started by seeking the views of stakeholders.</p> <p>Provide the evidence needed to support enforcement and the advice to assist self-compliance.</p>
<p>Communicating the vision</p> <p>We will champion the case for sensible health and safety controls that are sensibly applied. Our goal is not to have a risk-free society but one where risk is properly appreciated, understood and managed. We want to enable activities to take place that might otherwise give rise to concern, To communicate this message effectively, we need to develop more mature, open, transparent and inclusive two-way communications with a wide range of stakeholders. We want productive dialogues, particularly at the regional level.</p>	<p>Improve the inclusion of risk concepts and health and safety skills in the National Curricula and ensure that safety critical professionals receive adequate education in risk management. Improve understanding of how to communicate better the management of risk to all our stakeholders.</p>

The contribution that science will make to HSE’s work varies depending on the nature of the problem, the maturity of the technology and our understanding of the related technical, social and human factors issues. The following paragraphs illustrate how the nature of science activities changes as a technology matures and our knowledge of any associated risks develops. We will continue to keep the range and balance of our science activities under continual review and ensure that these important resources are used effectively.

Identification of new risks: With new technologies, workplace developments and social change, a key activity is horizon scanning to anticipate, assess, evaluate and prepare for any new or changed risks in the workplace and to the public from work activities. HSE will scan the horizon to identify developments in technology, the workplace, socioeconomic trends which affect the labour market, the UK political agenda, the EU and international developments which could significantly affect health and safety in the workplace. HSE will use research to further our understanding of the emerging risks.

Example: Nanotechnology. HSE identified nanomaterials as having the potential to cause new ill health and fire and explosion risks. We have contributed to Royal Society review on nanotechnology, focusing on new risks from the currently available technology. HSE has produced an information note on precautions for workers to adopt. It adopted the precautionary principle because of the uncertainties with the available science. HSE will encourage, in collaboration with others, the development of the science on potential new ill health and fire and explosion risks and measures to control these risks. HSE will also monitor the development of the technology, identifying other new risks.

Provision of risk information: Once a technology is in use, it is the responsibility of those who use it in the workplace to ensure that any risks they create are properly controlled. However, HSE working in partnership with employers and employees, uses its in-house specialists, HSL and an extensive research programme to help develop the necessary regulations, standards and guidance. The knowledge gained in this way is also used to inform the regulation of workplaces ensuring that activities are controlled in ways that are proportionate to risk, facilitating technological progress by understanding both costs and benefits.

Example: COSHH Essentials. COSHH Essentials was developed and launched in 1999 to protect workers from health risks from chemicals. It uses a unique system of hazard risk banding to provide small and medium enterprises with a simple solution for carrying out a risk assessment under the Control of Substances Hazardous to Health Regulations (COSHH). The system identifies the proper controls for the substances used and the way in which they are used. In 2001, research was undertaken to convert the paper version of COSHH Essentials into an electronic expert system, which carries out all calculations behind the scenes making it even simpler and quicker to use. The user is able to print off or download all the information needed to provide proper controls from exposure to chemicals in their workplace. The tool is available free on the Internet at: www.coshh-essentials.org.uk. Web statistics to date show that there have been just over 150,000 unique visitors to the site and over 148,000 risk assessments completed.

Incident Support work: Incidents continue to occur and some of these are serious, involving fatalities, major injuries and ill health. HSE investigates these to understand the causes and propose remedial measures and make knowledge widely available for future preventative action. In support of this, HSL provides a fast, expert, multidisciplinary forensic support service for a wide range of incidents. HSE funds research at HSL to develop analytical techniques and improve its reactive response.

Example: Potter’s Bar investigation. Following the train derailment in May 2002, which killed seven people, the Field Engineering Section of HSL took the lead in the technical investigation. Where required, and working under the direction of HSL, additional specialist expertise was obtained from outside organisations. Point 2182A was identified as the cause of the derailment and removed to HSL's Buxton site for detailed examination. The vehicles were also examined. Great care was taken to maintain the integrity of the evidence and HSL worked in conjunction with all representatives of interested parties to ensure they were satisfied with the investigation and so could not raise this as an issue in any potential legal proceedings. The results of the examination of point 2182A raised several safety concerns, which were brought to the immediate attention of Railtrack. In addition, further research related to the impact of vibration on points was commissioned to try and prevent such an event happening again.

Management of risk information: By the time a technology is mature, HSE will have an extensive understanding of the risks and the means to ensure that these are properly controlled. We manage knowledge to ensure that appropriate scientific and technical information and the practical expertise of our specialists is made available to implement HSE's and LA's operational and policy activities.

Example: ALARP. Reducing risks “as low as reasonably practicable” (ALARP) is a key requirement of British occupational health and safety law. In principle, reducing a risk ALARP involves weighing the risk against the sacrifice needed to remove or reduce it, and deciding whether the sacrifice is warranted. The decision is weighted in favour of health and safety because the rule is that a risk control measure should be implemented unless the sacrifice is *grossly disproportionate* to the risk reduction achieved. In practice, in the majority of cases, individual duty-holders will not have to undertake an explicit weighing of risk against sacrifice because the risk control measures that they have to adopt are already established as authoritative good practice which represent a consensus between stakeholders as to what is reasonably practicable. Scientific evidence about risks and the effectiveness of control measures provided by HSE is often the basis of this consensus.

5 Strategic Programmes

HSE will deliver its contribution to the HSC Strategy through five SPs. Table 2 provides an indication of the key areas in which research will contribute to the work of the SPs. These arise from well developed, strategic research plans supporting the main programmes. A more detailed description of planned research work will be issued each year in the Strategic Research Outlook document.

As shown in Table 3, over 70% of HSE's scientific and engineering staff and 50% of HSL's staff are involved in delivery of these SPs. HSE has recently reviewed how science and engineering staff contribute to the delivery of its work. This review concluded that the overall proportion and pattern of scientists and engineers in HSE's workforce was generally right for its business. However, significant changes are needed to improve flexibility in the use of specialists and their input into delivery of the SPs. Over the next year, HSE will pilot some new ways of deploying its resource to increase flexibility. For example, specialists in work psychology and organisational behaviour (Human Factors) will be managed as a single pool of resource drawn on by the SPs. The review also recognised that HSE needs to increase its capabilities on health and in particular in human and organisational behaviour, social sciences, epidemiology and statistics. HSE will continue to increase its capabilities in the areas identified through its in-house resource and its support arrangements. HSE's SPs are evolving and the research and support contribution is evolving with them. Some themes common to all of the Programmes are emerging:

- Developing the evidence base;
- Developing understanding of the impact of HSE's interventions;
- Establishing the intervention-effect business model for each SP, formulating agreed trajectories to show progress against the strategic targets and developing more robust indicators to measure progress against these trajectories;
- Getting greater involvement of stakeholders;
- Understanding how to communicate better with our stakeholders.

In addition to supporting the individual SPs, HSE science also supports a number of mandatory activities, of which the larger elements are incident investigation and statutory schemes, e.g. Notification of New Substances (NONS). This mandatory work uses 12% in-house resources and 40% of HSL resources, mostly on forensic incident investigation. HSE will retain the ability to investigate a diverse range of incidents in all of the industries for which we are responsible, to determine what went wrong, propose remedial measures and take enforcement action where necessary. Such work also provides important intelligence and knowledge to feed into the SPs.

Finally, enabling and underpinning work, which cuts across SPs, will be undertaken to ensure HSE's effectiveness. Elements of this work, largely provided by the Corporate Topic Groups (see Section 8.1, Appendix 1), deliver improvements to health and safety in the medium to longer term, for example through the development of standards and guidance in collaboration with industry. HSE has taken a strategic decision to cut back on such activities to allow more effort to be given to delivering the SPs and the improvements in health and safety needed to achieve the strategic targets. The consequence of this is that other parts of the health and safety system

may need to undertake more of this work if we are to retain the longer term improvements in health and safety that this work delivers.

New directions for this strategy include the planned introduction of an episodic survey of health and safety in Britain's workplaces, a more formal horizon-scanning process and a reduction in the amount of money spent on Major Hazards research:

- The new **Workplace Health and Safety Survey** will be a large-scale, representative survey of the state of occupational health and safety in Britain's workplaces, across all economic sectors, with inputs being sought from up to 3,000 employers and up to 30,000 employees. The overall aim of the survey is to enhance the data on occupational injury and ill health by estimating self-reported health and safety outcomes in the context of workplace conditions and employers' health and safety systems and enable us to monitor better HSE's performance against its strategic targets. This will significantly strengthen the information base for our policy and operational initiatives. It is planned to conduct the survey on a periodic basis, probably bi-annually, in parallel with the Labour Force Survey, managed by the Office for National Statistics. This new national survey is intended to evolve into a key data source, among a range of data sources, used by HSE to assess the state of health and safety at work in Great Britain, now and for the future.
- **Horizon scanning** will identify issues with the potential to change or present significant new workplace risks that are emerging in the medium to long term. HSE's horizon scanning activities will identify developments in technology, the workplace, socio-economic trends, which affect the labour market, trends in public attitude to health and safety and national and international political changes which could significantly affect workplace health and safety in GB. It will involve HSE's scientific and operational staff and policy makers. Intelligence on new developments will be gathered through Communities of Practice and Interest involving a wide range of external stakeholders. The results will be assessed and prioritised enabling the HSE Board and HSC to identify where further work is justified. Current examples of detailed studies commissioned as a result of horizon scanning are those on nanotechnology, the hydrogen economy, distributed electricity generation and gene therapy.
- **Major Hazards** research has consumed over 20% of HSE's research budget for many years, often to support the development of technical standards. However these industries are mature, are well endowed with competent scientists and engineers and therefore they should take greater responsibility for risk control research and standard setting.

6 Science and Risk Communications

HSE is committed to improving communications with all stakeholders and has an over-arching communications strategy. We recognise the importance of informing and involving all those with an interest in health and safety how HSE applies science to help the delivery of HSC's strategy. We look to the wider scientific community for assistance in refining our needs and requirements. It is important that the work we undertake is targeted either where maximum benefit will accrue to the workforce or where we need to be better informed on the risks from new or changing hazards in the workplace of tomorrow.

HSE's science web pages were redesigned in Autumn 2003 and are continually updated. They can be found at: <http://www.hse.gov.uk/science/index/htm>. The website provides access to technical reports produced from our research as well as a projects directory for work commissioned since 2001. We are keen to receive feedback on the projects we commission and the directory provides the opportunity for users to comment on the work being undertaken.

A new e-newsletter, HSE Science and Research Outlook (www.hse-researchoutlook.com), provides information on all aspects of our science and technology programme. Alongside the newsletter, we will publish foresight reviews on science issues of the future. Through our Horizon Scanning web pages, we will be inviting comments and ideas on these from stakeholders.

To complement these electronic systems we aim to improve the ways we communicate and explain scientific information and risk to stakeholders, and engage them in promoting better understanding and confidence in science and effective risk management. In particular we will ensure we implement the government's ['Principles on Managing Risks to the Public'](http://www.hm-treasury.gov.uk/media/8B2AE/risk_principles_220903.pdf) (www.hm-treasury.gov.uk/media/8B2AE/risk_principles_220903.pdf); paying particular attention to how we communicate scientific uncertainty and take account of people's concerns about different types of risk.

7 Working with others

The targets in the HSC Strategy are for the health and safety system as a whole and HSE will work actively with stakeholders to secure their delivery. We are just one organisation among many across the UK, Europe and internationally, that has an interest in the science relating to occupational safety and health.

HSE already has a number of formal and informal national and international links, and we will build on these to identify gaps in scientific understanding, to share knowledge, to coordinate work with that underway in the wider science base and to undertake collaborative projects and work, including:

- Quantification and control of the hazards associated with the transport and bulk storage of fireworks with European partners (through the European Union Framework Programme);
- Nanotechnology, with the Royal Society and the Royal Academy of Engineering;
- Various issues related to carbon monoxide in domestic premises in conjunction with Advantica Technology (British Gas plc), Gas de France and other industrial partners;
- A number of construction-related projects, such as: façade retention; designing in safe practice for building maintenance and repair; and guidance on the Construction (Design and Management) Regulations 1994, coordinated by CIRIA and involving a number of industrial and other partners;
- Undertaking workshops to bring together and focus the research community on cross cutting issues, such as: shiftwork and breast cancer; susceptibility and variability in human response; male fertility research, neurotoxicity, possible adverse health effects of magnetic fields; ageing, work and health; low toxicity dusts; obstructive lung disease; and the Borna Disease virus.

We will extend our work with other Government organisations to take account of their activities, identify issues of common interest and improve joint working on cross-departmental and multi-disciplinary challenges, thereby meeting one of the key recommendations of the Phillips Review of BSE. Examples include:

- With the Department for Work and Pensions, we have joint interests, share information and work collaboratively on topics such as stress, rehabilitation, vulnerable groups and older workers, active case management, work psychology, social research skills and major episodic surveys.
- With the Environment Agency, we have recently re-energised joint collaborative activities on science by agreeing a new Memorandum of Understanding. Our collaboration has already covered topics such as hand-arm vibration, antifoulants, environmental monitoring and assessment, chemical storage, Control of Major Accident Hazards (COMAH) and waste handling.
- With the Health Protection Agency, we have existing working links on biological agents, the development of surveillance schemes, ionising radiation and the effects of chemicals on health. We also intend to improve links on behavioural and social science and demographically linked work, particularly in relation to vulnerable groups.
- Through the Risk Programme Steering Group and its Managing Risks to the Public Sub-group to implement the recommendations of the Strategy Unit Report “Risk: Improving government’s capability to handle risk and uncertainty. This Programme continues the work of the Interdepartmental Liaison Group on Risk Assessment (ILGRA), which was established by HSE to help secure coherence and consistency within and between policy and practice in risk assessment as undertaken by Government and help disseminate and advance good practice.
- Through the Interdepartmental Group on Health Risks from Chemicals (IGHRC) to stimulate the development of new improved approaches to the assessment of risks to human health from chemicals.
- With Department for Work and Pensions, Customs and Excise, Inland Revenue, the Immigration Service, the Home Office and the Department for

the Environment, Food and Rural Affairs to target seasonal and migrant workers and involvement in 'Operation Gangmaster' initiative.

We will continue to draw out opportunities for information exchange and collaboration with others, whether within the global research community itself, or with Government organisations (in the UK or other countries), international working groups or with other bodies with whom we have common interests. A growing proportion of our resource – people and funding – involves some degree of collaboration with others and we will continue to explore all available avenues to benefit from such joined up working.

Table 2: Research priorities of the Strategic Programmes. (Please note that Table 2 presents the information that is currently available. Developing the content for this table will be an iterative process and from this starting point we will work with Programme Managers to improve the information provided as the Strategic Programmes Strategies develop)

Strategic Programme	Scope	Science Priorities¹
Health and Safety Hazards (Link to Programme webpages)	Workplace transport	Intelligence gathering and analysis of causation factors, particularly behavioural issues and safety management systems. Identification of practical ways to improve the safety of the work site, vehicle and driver. Impact evaluation of various interventions.
	Falls from height	Evaluation of fall protection systems. Development of expert systems to guide dutyholders. Encouraging the designing out of the need for work at height. Perception of risk in occupations vulnerable to low falls from height. Gathering of data to identify causative factors and to identify areas where efforts can best be directed.
	Slips and trips	Gathering information on causes – technical and human factors. Determination of baseline statistics. Evaluation of the impact and adequacy of available countermeasures and production of case studies. Development of standards and testing methodology.
	MSD	Involvement of stakeholders. Gathering of information on incidence and prevalence in order to target high-risk groups. Rehabilitation; to find out which solutions work and under what circumstances. Determining the range of competencies and skills that apply to MSD and evaluating the effectiveness of training and development. Identification of the information, advice and support needs of stakeholders.
	Work Related Stress	Identification of good practice in stress prevention and rehabilitation. Establishment of reliable baseline data and firming up of indicative targets. Elucidation of the benefits for taking organisational action on stress. Development of our understanding of the relationship of work stressors and health outcomes. Specific stressor areas, e.g. demand, support, role, relationship, change.
	Chemicals	Under development
	HAVS & Noise	Under development

¹ These arise from well developed, strategic research plans supporting the main programmes.

Sectors <i>(Link to Programme webpages)</i>	Construction	<p>Safety - identification of key risk areas, of good practice in those areas and development of the means of dissemination of this information;</p> <p>Health – determination of the extent of ill health in the industry and its causes, and development of mechanisms for its reduction;</p> <p>CDM Dutyholders – research into the level of H&S education amongst designers and their clients, and into the drivers that will increase the uptake of H&S issues.</p> <p>Influencing stakeholders – identification of those groups whose actions affect the extent of injury and ill health and of the most appropriate ways to influence them.</p>
	Agriculture	<p>Behavioural research on how to convert H&S awareness into actions, e.g. how to influence farmers’ attitudes. Evaluation and the development of tools for evaluation.</p> <p>Analysis of accident statistics – causation factors</p> <p>Extent of ill health – rehabilitation.</p>
	Health Services	<p>Behavioural issues – contribution of training, work environment design and work patterns to workplace violence.</p> <p>Management issues – how to influence management to take up the business case for H&S management and rehabilitation; measures of effectiveness of interventions.</p> <p>Health risks – examples of good practice, work acquired infections, stress, MSDs.</p>
	Government as an Exemplar	<p>Development of a tool that can be used to evaluate HSE and LA enforcement activity to put enforcers/regulators on the same assessment footing.</p> <p>Extent of existing OH support and sickness absence management, good practice models.</p> <p>Sickness absence statistics.</p> <p>Sickness and OH support in areas such as the emergency services.</p> <p>Targeted research in specific LA areas where specific trends have been identified with no apparent solutions.</p>
	MUST (Manufacturing, Utilities, Services & Transport)	Under development

<p>Major Hazards (<i>Link to Programme webpages</i>)</p>	<p>Nuclear Offshore Onshore Railways</p>	<p>Cross Cutting Issues: characterise emerging operational needs on key cross cutting issues in the major hazard sectors, including containment, ageing plant structural integrity and industry sustainability human factors and management of change and emergency arrangements</p> <p>Human factors: deliver HF 'science' programme (2004 – 2007) to resolve key issues in organisational change, competences , safety critical communications and safety cultures. This work will form the basis of definitive guidance on good practice, mainly aimed at onshore chemical industries.</p> <p>Management and organisational factors; deliver programme of work (2004 – 2006) developing HSE's understanding of the key features for effective Safety Management Systems</p> <p>Effectiveness of the H&S framework : support key evaluation programmes that provide evidence of the effectiveness of HSC/E's permissioning regimes</p> <p>Process Safety:</p> <ul style="list-style-type: none"> a) commission specific projects identified through peer review in HSE's Fire Protection interest Group – to conclude good practice guidance on water deluge systems and passive fire protective coatings for pressurised storage vessels. b) Fireworks – deliver EU sponsored research programme (2002 – 2006) reviewing the classification of certain types of fireworks c) carry out research associated with the emerging 'hydrogen economy' by collaborative work with UK and EU industrial partners <p>Risk assessment: evaluate societal risk techniques to support high level policy and operational strategies for regulation of onshore major hazards</p> <p>Programme of Nuclear Safety Research: a balanced programme agreed with HSC that promotes the application of risk assessment and technological understanding to standard setting and enforcement activities based on NSD's and industry's needs for improved knowledge to target safety improvements and prevent serious system or plant degradation. In addition support contracts are used to provide additional support to NSD assessors, by access to specialist advice or expertise not available within NSD or HSE.</p>
<p>Local Authority Partnership (<i>Link to Programme webpages</i>)</p>	<p>Development of the new partnership between HSE and LAs.</p>	<p>Identification of prevalent occupational health issues in LA enforced sectors and determination of the true picture of LA enforcement activity on occupational health (as opposed to safety) issues.</p> <p>Identification of the routes to influence LAs' compliance with section 18 HSAW and guidance.</p> <p>How to distinguish effective joint interventions from the less effective. Identification of key training needs for LAs and how they can be delivered cost effectively. Identification of any extra burdens on HSE's resources from closed joint working.</p>
<p>Better Health at Work Partnership Programme (<i>Link to Programme webpages</i>)</p>	<p>Occupational H&S support systems Worker involvement Corporate social responsibility (including ELCI) Rehabilitation</p>	<p>Comparison of OH provision in other EU member states to establish best practice.</p> <p>Evaluation of pilots.</p>

Table 3: Current use of science resource

	STRATEGIC PROGRAMMES						
	1	2	3	4	5		
	MAJOR HAZARDS	HEALTH & SAFETY HAZARDS	SECTORS	LA PARTNERSHIP	BETTER HEALTH AT WORK PARTNERSHIP	MANDATORY ACTIVITIES	UNDERPINNING ACTIVITIES
Approximate HSL Resource (% of total)	20%	25-30%			<5%	40%	10%
In-House Science Resource ¹ (staff years and % of total)	450 (57%)	110 (14%)			<10 (<2%)	130 (16%)	90 (11%)
Staff years and % of total	570 (72%)					220 (28%)	
Budget allocations for commissioned science 2004/05 (£M/% total) ³	9.0 (23%)	5.0 (13%)	1.6 (4%)	0.5 (1%)	1.0 (3%)	14.5 (38%)	6.9 (18%) ⁴
Predicted allocations for commissioned science 2005/06 (£M/%total)	To be added	To be added	To be added	To be added	To be added	To be added	To be added
2006/07 (£M/%total)							
2007/08 (£M/%total)							

¹ Excludes HSL

² Excludes Biocides and Pesticides

³ Excludes spend on Nuclear Safety Research Programme and railways research funded through the Rail Delivery Programme and the Rail Standards and Safety Board.

⁴ Includes £1.9M for communications

8 HSE's Science Arrangements

8.1 People and competence

HSE has a first rate scientific staff, with around 780 in-house specialists costing around £35.5M in total salary costs. They comprise a very broad range of specialisms, ranging from the traditional engineering professions (e.g. mechanical engineers, electrical control engineers) through occupational health specialists (including doctors, nurses and occupational hygienists), statisticians, economists and social scientists to highly specialised deep topic specialists (offshore well engineers and nuclear criticality specialists). All of our specialists have recognised qualifications and experience in their topic and most are affiliated with professional bodies.

HSE's specialists are deployed around the organisation to meet its local or corporate business needs. Most specialists are inspectors, located within the Operating Directorates. This enables them to work closely with their regulatory colleagues providing specialist support and advice and also enables them to work directly as regulators with our stakeholders. Many of the engineering specialists are located in those parts of HSE that deal with the Major Hazards industries, reflecting the highly technical nature of these industries. Some of our specialists are centrally based in Corporate Topic Groups (CTGs). These provide a corporate source of expertise for the organisation and contribute to corporate functions such as horizon scanning and knowledge management in their topics. Some of the CTGs also deliver statutory schemes on HSE's behalf.

The profile of the risks from work activities has changed substantially in recent years and will continue to do so. HSE's scientific manpower and career development planning approaches are being adapted to cope with these changes, to increase flexibility and to ensure best value for money.

8.2 The Health and Safety Laboratory

HSL is an in-house agency of HSE. It concentrated its activity on its Buxton site following the opening of a new laboratory in autumn 2004. HSL's vision is to be a world-class health and safety laboratory and its primary aim is to be the first choice supplier of effective research, scientific support and intelligence to HSE, in support of HSE's business objectives. It also provides scientific services and advice connected with health and safety to other public and private sector organisations in the UK and overseas. HSL will continue to focus on improving its performance and to publish an Annual Performance Agreement setting out key targets for the year.

HSL's strength is the sum of the range of skills and experience of its people at the leading edge of health and safety science, enhanced by their ability to network with other experts in their field. To enhance and promote HSL's reputation and capabilities, its staff are continually strengthening the links with scientific and technical organisations at a national and international level. For example:

- HSL's health sciences activity has led to its recognition as a Collaborating Centre in Occupational Health for the World Health Organisation (WHO) for a number of years. This status has recently been extended by WHO to the whole of HSL in recognition of the contribution made by all areas of the laboratory in the investigation of workplace health and safety problems.
- HSL is a founder member of the newly formed Partnership for European Research in Occupational Safety and Health (PEROSH), a network of twelve occupational safety and health research institutes from across Europe.
- At a global level, HSL's Chief Executive chairs an international group of directors of health and safety laboratories. The group was formed a number of years ago and comprises 20 members from Western and Eastern Europe, North America and Australia. A similar group is being set up across the UK.
- Locally, HSL chairs the Sheffield Occupational Health Development Group. The group brings together representatives from HSE, Sheffield hospitals, Sheffield City Council, the Engineering Employers' Federation, the University of Sheffield and the local Primary Care Trust to develop a clear framework for occupational health services on a citywide basis.
- At a working level, HSL's scientists represent HSE on many national and international technical standards committees and in some cases lead the UK delegation negotiating European standards.
- The Laboratory also participates in collaborative projects, which are part-funded under the European Union's Framework Programme. Such projects unite expertise from across Europe to achieve common results and goals.

HSL has evolved over the years to fit HSE's reactive needs for suitable and wide-ranging health and safety science skills, which are readily available to solve problems and are independent of other interests. These skills and competencies fit alongside HSL's facilities and equipment to provide the total support service valued by HSE.

HSL's skills, expertise and external networks cannot be sustained by reactive work alone. HSL needs to be involved in research and technical development activities in order to have internal and external credibility, and be able to trade with other national and international experts. HSL's research activity, generating new information and techniques, keeps it at the leading edge of the science that underpins HSE activity. Failure to sustain parts of its skills and expertise by undertaking relevant research activity would progressively lead to a narrowing of its field of activity and its multi-disciplinary strength. In 2003/04, HSE spent around £22m with HSL, including £18.5m (>80% of the total) on scientific support. HSE will aim to ensure that at least 20% of the work it procures from HSL is research in order to maintain HSL's position as a world class laboratory.

HSE is both owner and major customer of HSL, and will continue to maintain a strict separation between these roles. As owner, the Executive holds six-monthly planning meetings with HSL's Chief Executive in the presence of independent advisers. The Science Strategy Committee (SSC) oversees the customer relationship and the Chief Scientist Unit maintains day-to-day liaison with HSL. HSE customers procure research and scientific support from HSL under a 3-year Scientific and Technological Services Agreement, which is rolled forward annually. The Agreement provides HSL with a guaranteed minimum level of core income from HSE (£10m in 2004/05).

We will examine how best to ensure that LAs have improved access to HSL expertise both for work to support the SPs and investigations.

8.3 Science Governance

Our governance arrangements have evolved during the past two years, and have reached a mature stage that has proved itself and is endorsed across the organisation.

The Chief Scientist reports to the Director General and is a member of the HSE Board, and is advised on strategic direction, quality issues and resources by the SSC, comprising HSE's top managers and outside advisors. The Chief Scientist is supported for the use of commissioned science by the Chief Scientist Unit, who manage HSE's science budget in accordance with business needs and priorities, exercising an appropriate challenge function with regard to agreed HSE priorities, use of public funds, competition, etc. A new Project Record Form (PRF) was introduced in April 2004 to strengthen the arrangements to ensure that science funds are used effectively to support business objectives by requiring those who commission a piece of research or planned support to:

- Identify at the planning and appraisal stage, the business objectives/targets to which the project will contribute and show how that contribution will be measured and evaluated.
- Ensure, subsequently, that the deliverables are properly and effectively utilised. The PRF requires evidence on how the project outcomes have been exploited and of the impact on realisation of operational or policy programme objectives

Usage of the PRF will be kept under continual review and refinements introduced as appropriate to ensure that HSE continues to make the best use of its science funds.

The Corporate Science and Knowledge Unit provides support on the development and use of in-house resources and works with the Chief Scientist Unit on the strategic direction and balance of HSE's scientific activities; and developing suitable procedures and guidance for operation of internal resource and the Research Programme.

A Delivery Board, comprising HSE top managers and a representative from the Department for Work and Pensions, oversees delivery of HSE's Strategic Programmes, reviewing the strategic fit of the programme objectives and evaluating the results of the programme interventions. The Business Improvement Efficiency Board, made up of the Executive, Chief Scientist, Head of the Resources and Planning Directorate and the senior representative from our IT and Business Support Partners, oversees the delivery of all major improvement projects ensuring a good fit with the strategic priorities and efficient use of funding. The Chief Scientist advises both Boards on the science requirements.

The Chief Scientist also oversees HSC/E's Scientific Advisory System. HSC/E are committed to ensuring that our policies are based on the best available scientific advice, in line with the Chief Scientific Adviser's Guidelines 2000 and that we learn the lessons from the Phillips BSE Inquiry report.

HSC also receives integrated scientific and technical policy advice from some Subject Advisory Committees, which comply with the Chief Scientific Adviser's Code of Practice for Scientific Advisory Committees. Details of the HSC Advisory Committees can be found at: <http://www.hse.gov.uk/aboutus/hsc/iacs/index.htm>

8.4 HSC Coordinated Programme of Nuclear Safety Research

The HSC coordinated Programme of Nuclear Safety Research sits alongside the main science programme. The regulatory process gives rise to issues that NII believes can be addressed at least in part by research. These are then used to generate the nuclear safety research programme, which is mainly commissioned by the licensees, with the balance being commissioned by HSE and recharged to the licensees via a levy. Because of this, it is managed as a largely separate budget (total value in 2004/05 of £8.6 m). Scope for collaboration with the main body of major hazards research is limited in some technical areas because of the unique nature of much of the nuclear technology, however, opportunities are taken to share research, for example in the areas of human factors, civil engineering and structural integrity.

There exists also a separate levy funded nuclear safety support budget, which is used for shorter-term reactive work.

8.5 Science Delivery

HSC/E has broad responsibilities, as shown by our science priorities. Science requirements are sourced from and delivered by internal and a range of external providers to guarantee access to the required quality of service in a timely manner.

Most work is commissioned against a defined HSE specification, by competition wherever appropriate. HSE will commission work from organisations that can demonstrate that they have the necessary capability and follow sound health and safety and environmental practices. HSE will also take into account the existence and proper operation of appropriate quality management systems, and in certain circumstances, e.g. where the aim of the work is to underpin regulatory activity, accredited status will be required.

In commissioning research, HSE has to take into account various external and internal requirements, including those arising from the government's control of surveys, the European Union Public Procurement Directive, Treasury spending limits for individual projects and HSE's Research Ethics and Scrutiny Committees.

Framework Agreements, enabling the rapid provision of technical support from a number of specified suppliers, have been operated successfully for a number of years. The Agreements will soon be retendered enabling HSE to continue to obtain a range of support services, to complement our work on risk assessment and the control of technological hazards, on a call-off basis. HSE will also explore the possibility of setting up similar, synergistic arrangements for longer-term programmes of work or to allow easy access to the services provided by strategic suppliers.

Our procurement team play an increasingly vital role in providing HSE with a route to appropriate competence (quality and quantity) on an assured basis with value for money.

8.6 Monitoring and evaluation

From May 2004, we have introduced a more strategic monitoring and performance measurement system – using the established balanced scorecard technique – which will provide the Chief Scientist and the HSE Board with an improved overview of activity within the Strategic Programmes and its impact.

Science helps to make policy choices and deliver policy, and as such it is evaluated primarily as an integral component of work to evaluate the effectiveness and value for money of policy initiatives. Several major policy evaluations have been concluded in the past two years, including, for example, the evaluation of the Rail Safety Case Regulations, which noted the positive contributions of science to the wider performance of HSE in this area. In addition, there have been several smaller exercises carried out to research into the effectiveness of science as a mode of intervention, to improve our calibration of this important ‘tool’ and our confidence in terms of making the best choices regarding methods and approach that are appropriate to a given business challenge.

We will significantly increase our effort on evaluation. HSE has not undertaken sufficient evaluation in the past and we face key knowledge gaps that will need to be addressed. Evaluation will also be undertaken on the SPs to assist the HSE Delivery Board in monitoring progress against the strategic targets.