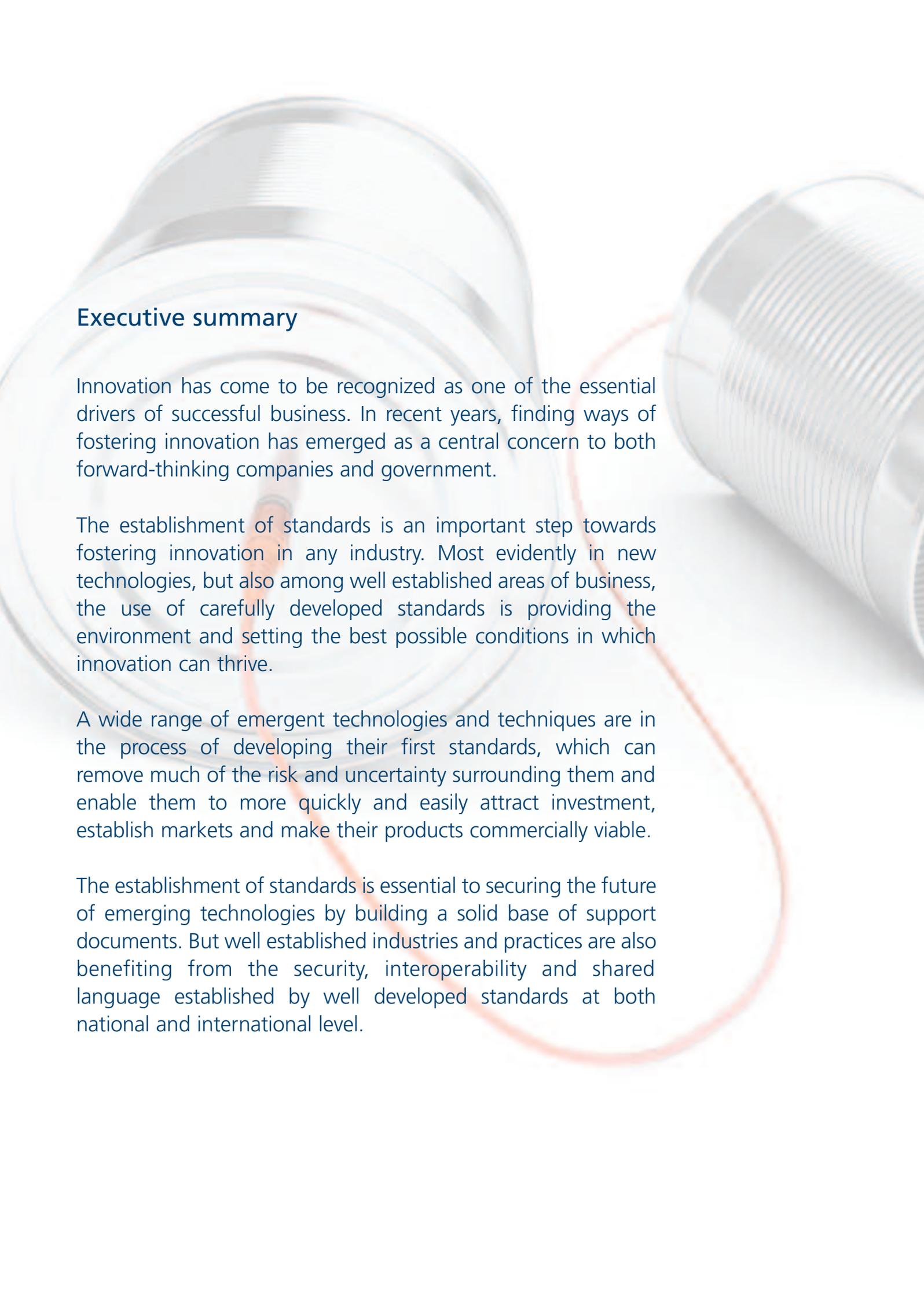




# Innovation

The role of standards

*raising standards worldwide™*



## Executive summary

Innovation has come to be recognized as one of the essential drivers of successful business. In recent years, finding ways of fostering innovation has emerged as a central concern to both forward-thinking companies and government.

The establishment of standards is an important step towards fostering innovation in any industry. Most evidently in new technologies, but also among well established areas of business, the use of carefully developed standards is providing the environment and setting the best possible conditions in which innovation can thrive.

A wide range of emergent technologies and techniques are in the process of developing their first standards, which can remove much of the risk and uncertainty surrounding them and enable them to more quickly and easily attract investment, establish markets and make their products commercially viable.

The establishment of standards is essential to securing the future of emerging technologies by building a solid base of support documents. But well established industries and practices are also benefiting from the security, interoperability and shared language established by well developed standards at both national and international level.

## Driving change

Whether in business, technology or public policy, innovation is a central driver of change and development. Across fields as diverse as technical development, product design, corporate structure, supply chain management and regulation, innovation is a crucial factor that enables companies to overtake their peers, industries to take great steps forward and nations to move to new levels of development and efficiency. As leading management thinker Professor Michael Porter of Harvard Business School puts it: “Innovation is the central issue in economic prosperity.”

Successful encouragement and use of innovation can produce profound results in any number of areas. New products and services, new business models, improved organizational structures and processes, more effective financing and more successful marketing can all result from innovation. Innovation can create both incremental improvements and radical, breakthrough advances.

In recent years, the central role of innovation has become increasingly recognized in both the private and public sectors, and a mini-industry dedicated to achieving innovation and removing the barriers – whether institutional, practical or psychological – has developed. The pursuit of innovation as a tool of differentiation and competitiveness has become a central business activity.

Jeffrey Immelt, chief executive of General Electric, indicates the importance that is now placed on innovation in business thinking. “The only source of profit, the only reason to invest in companies in the future, is their ability to innovate and their ability to differentiate,” he says.

Standards have a key role to play in the pursuit of innovation. The forces that drive, and the mechanisms for fostering, innovation are both profoundly augmented by the presence of standards. They provide a common language for new concepts as well as systems of metrics and methods of comparison that provide a necessary environment for innovation to take off.

In a variety of fields, ranging from cutting-edge technologies such as nanotechnology and regenerative medicine to well established areas like management systems and service industries, the development of new standards is creating the conditions to allow rapid and sustained innovation to take place.

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## A foundation for new technologies

Standards help innovation in a number of ways. In the area of new technologies in particular, standards are an essential tool to enable new ideas to take root and progress.

*The use of a standards framework enables innovative companies to increase the speed with which they can bring their products to market.*

The most basic contribution standards make is in establishing common vocabularies, enabling innovators working on the same technology in different organizations and locations to communicate with confidence about common subject matter without being hampered by the need to spend time and effort establishing what it is they're talking about. The collaborative nature of the standards framework frees innovators to concentrate on finding ways to differentiate their products and services.

Standards are also essential to the establishment of markets for new technologies. Establishing a market for an emerging technology can be a difficult process, and the use of standards makes a significant impact by allowing investors to understand what the potential investment involves and enabling companies and developers to describe their products and services in marketable terms.

Standards provide assurance of health, safety and other aspects crucial to the development of viable markets in new technologies. The independence of BSI's standards and its standards development process – and, by implication, the freedom from particular commercial bias – can be critical in gaining public acceptance of new technologies.

The commercial exploitation of innovative ideas is also facilitated by standards, which provide a basis for dissemination of information and an accepted framework within which patents can be drawn up, removing undue proprietary interests and barriers to trade. The use of a standards framework enables innovative companies to increase the speed with which they can bring their products to market.

Standards can encourage government to promote and use innovative products and services in its procurement process by allowing it to know clearly what those products and services are and how they can be measured against each other and existing products.

By evolving as technology develops, standards support technological innovation and can also be used to set targets for technologies to aim for in terms of performance specifications. “Far from impeding innovation, standards deliver competitive advantages to the industries and countries where they are most developed, and they embed those countries’ intellect and expertise into the international innovation agenda,” says Mike Low, director of BSI British Standards. “Standards provide support for innovation from original concept through to market.”

## Standards at the frontier

The effect of the development of standards on innovation is most clearly demonstrated in the field of new technologies. Three areas in which progress is particularly advanced in the United Kingdom are ultrasonics, biometrics and regenerative medicine.

The field of ultrasonics is relatively new, and the United Kingdom is leading the way in developing standards related to the characteristics and method of measurement for electroacoustics systems and equipment.

The public utility of the work undertaken by BSI’s ultrasonics committee is particularly evident in the medical sphere. Standards documents currently under development include those dealing with areas of innovation such as underwater acoustics, pulse echo scanners and hydrophones. The committee is also considering standards in relation to diagnostic ultrasonic equipment and physiotherapy systems.

BSI has been instrumental in rationalizing a raft of standards in the area, and in promoting the need for standardization in high-intensity focused ultrasound, a major worldwide growth area that is increasingly used in the treatment of cancers and other conditions. This is currently an area without regulation, and the development of standards will ensure degrees of safety and provide a framework to promote further innovation.

*Standards deliver competitive advantages to the industries and countries where they are most developed – embedding intellect and expertise.*

## CASE STUDY

# Innovation on the smallest scale

Nanotechnology is one area in which the recent development of standards is having a clear effect on assisting its growth. At the beginning of 2008, BSI published nine documents in this dynamic field, including sector-specific terminologies, a guide to safe handling and disposal, and a guide to specifying nanomaterials. These documents are creating the basis for rapid innovation in the area.

“Terminologies are important because people need to have agreement on what words mean: for example somebody can go and write a patent and be fairly explicit about it, which is helpful for innovation,” says Dr Peter Hatto, a leading expert on nanotechnology. “Innovation can also clearly be inhibited by concerns about safety and so on, so the documents that have been published take away some of the hurdles that could inhibit innovation.”

BSI also holds the secretariat of the international and European committees

developing standards on nanotechnology, which is working on the areas of terminology and nomenclature, measurement and characterization, environmental health and safety, and material specifications.

The lack of internationally-agreed terminology has allowed some companies to write very broad patents, which are preventing other people from patenting their developments, thus impeding innovation. Measurement and characterization will assist innovation by allowing participants to specify materials more carefully and check consistency and quality. Applying protocols for health and safety evaluation will also remove a considerable barrier to innovation.

“If people can see a specification they can develop their materials to meet that specification and thus innovate from a competitive point of view,” says Dr Hatto. “We need to have this strong foundation to enable the technology to move forward and thrive.”

Innovative work in the field of biometric identification systems is heavily dependent on the development of a number of international standards. The new epassport issued by the UK Identity and Passport Service uses biometric facial imagery as its main security feature, and the service has been recognized for its innovative use of standards. Expansion to the second generation of the epassport, which will contain both face and fingerprint identification, will use international ISO standards.

*To innovate you need to be able to translate an invention into routine practice. To do that, you need standards.*

The development of standards is also crucial to further innovation in the burgeoning field of regenerative medicine and stem cells. Dr Chris Mason of University College London, one of the world's leading experts in the area, says standards are essential to developing the field.

“To innovate in this field you need to be able to translate an invention into routine clinical practice. To do that, you need standards. With no standards, you don't move anywhere, because nothing's interchangeable. You can't share parts, you can't share knowledge, and things like patents become complex.”

BSI has published one document on regenerative medicine and is preparing another. The first (PAS 83) provides guidance on the codes of practice, standardized methods and regulation for use in cell-based therapeutics. It defines, for the first time, the value chain in the area, from the initial step of getting hold of cells all the way through to clinical trials, launch and post-market vigilance.

The next document (PAS 84) will be a terminology defining all the terms used in the field. Participants are coming into the area from a range of disciplines including tissue engineering, materials and stem cells, and consistent terminology is essential for laying the basis for them to function together and communicate optimally.

“When scientists talk to each other, we even use a term like 'stem cell' in many different ways depending on who you are and where you are, and that needs locking down,” says Dr Mason. “A vocabulary also helps to build a more reliable press, because I can refer journalists to a document, and that improves public understanding.”

## CASE STUDY

# Brave new water world

As the pressure to develop renewable sources of energy increases, wave and tidal energy are regarded as a potentially important part of the energy mix. These technologies are in their relative infancy, but a series of standardizing documents are being developed to help them through their teething troubles and foster their growth into fully viable industries.

Development of standards in this area is also at an early stage, with an international technical committee recently formed to draft standards across the whole area. The United Kingdom has, however, been leading the way in producing guidance documents through a process of consultation with the industry.

The most advanced documents are on wave performance testing and tidal performance testing, with others on wave resource assessment, interfacing with the electricity grid and manufacturing methods. These documents will be available for use in the United Kingdom by early 2009 and will then be used as base documents for developing international standards, giving the UK industry an advantage over other countries.

John Griffiths, technical director of the European Marine Energy Centre in Orkney and a leading consultant in the wave and tidal energy industries, believes the arrival of standards is a crucial step in the innovative development of this promising field. "All grown-up industries have standards and all industries that aspire to grow up need standards," he says. "The technologies are new and unproven, we haven't got very much in the water and we badly need to. For that we need confidence from the financial and insurance sectors. You've got to have standards to get that confidence."

The development of standards is expected to bring down the costs of this emergent technology and make marine energy competitive compared to other forms, both renewable and non-renewable. The documents being developed will make it easier for participants to install devices and begin generating energy, and will also help reduce development and running costs.

Without the guidance, there is a risk of the industry failing before it gets going properly because the costs of involvement may appear too large for investors in comparison to other renewable energies, such as wind and solar power, which have the advantage of standards that have been in place for many years.

## Continuity through innovation

Management systems and processes are another area that can benefit from the effect of standards in fostering innovation. One particular area in which standards are being actively developed is the field of business continuity management.

BSI has produced one standard on business continuity management generally and a second on business continuity management for ICT in particular, and is working on two others on crisis management and recovery, respectively.

John Sharp, former chief executive of the Business Continuity Institute, says the processes that are made possible by standards in this field ultimately lead to innovation. “The key element of business continuity standards is understanding your business. You’ve got to look at your business in terms of where it sits within the external environment and the needs and wants of all stakeholders. It forces you to look at what you do, how you do it and if there is a different way to do it that minimizes risk. That leads to innovation.”

## Good practice in services

As well as their role in fostering innovation in new technologies, standards offer similar benefits in support of innovation in services. By setting out good practices in a way that takes into account the needs of service providers and users, standards help to bring acceptance to innovative services, which in turn can make it easier for organizations to specify and procure those services and help service providers find markets for their products.

Standards also establish a common understanding between interested parties. Innovation across service industries is being driven by the availability of digital information, with industries as diverse as entertainment, transportation and financial services being transformed by electronic information and the internet. Standards play a crucial role in ensuring that information derived from those sources is interoperable and can be readily exchanged by all participants.

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Service standardization is currently a focus of activity across Europe, with a number of initiatives being aimed at protecting customers, raising standards, promoting a common European understanding of service quality, supporting cross-border trade and taking good practice from a national to an international level.

## CASE STUDY

### Going places

One service industry in which standards are increasingly crucial to innovative new working methods is the global transportation industry. Michel Danet, secretary general of the World Customs Organization, is clear about the importance of standards in transport innovation. "As customs administrations increasingly turn towards technology to bolster their strategies aimed at securing and facilitating the international supply chain, we see an important complementary role for ISO in the development of global standards, as is happening, for example, in areas such as electronic seals and RFID technology."

A number of recent standards in transport, covering areas such as intelligent transportation systems and facilitating freight movement and its intermodal transfer, will enable new technology to be applied to enhance security and efficiency, and thus foster innovative change.

Standards also play a role in helping to specify the platform that the end-user will need to receive a service, and that the provider will need to deliver it. An example of how development of open standards can enable new delivery channels and platforms is the development of the Motion Picture Expert Group (MPEG) standards on file formats, which have been implemented as international standards.

This development of a series of these standards, distilling research results and a patent pool to provide a bridge to practical application, opened the way to a flood of innovation that changed the way content is created and sold, helping to transform the audio-visual media industries.

The European Commission has mandated a study of how standards could promote the free movement of services across the EU. A significant programme of standardization work is also taking place in support of e-business, with applications across both services and manufacturing industries.

## The standard that fits

The development of standards is a flexible process that can vary to suit the requirements of the situation. The process is always rigorous and is characterized by close consultation with stakeholders, but it also involves different levels that can enable the foundations for innovation to be established as quickly as the situation requires.

New areas for standardization, such as newly emergent technologies, are often developed through fast-track mechanisms like a publicly available specification (PAS). These documents have been developed across a wide range of industries and technologies, where they set out common terminologies, metrics or concepts enabling businesses to innovate.

For these fast-track standards, stakeholders are drawn together in a consortium model where consultation takes place through steering groups and review panels chosen to be representative and close to the business issues, and through standing committees in related areas.

Formal standards in more mature areas are developed through a committee structure that operates at the national, European and international levels and develops standards and related documents by consensus. Participants include representatives of government, testing laboratories, suppliers, consumers, academic institutions, societal interests, manufacturers, regulators and trade unions.

British Standards are usually developed within 12–15 months, while international standards take around three years. Fast-track mechanisms like the PAS can be developed within a few months, allowing a foundation for innovation to be laid as quickly as possible.

A significant aspect for all business sectors, both public and private, is the management of innovation itself. Guidance and support on the recognition, fostering and development of innovative behaviour with regard to new or existing products, services and techniques can also be found in standards such as the latest edition of the guide to managing innovation (BS 7000-1).

*The development of standards is a rigorous and flexible process that can enable the foundations for innovation to be established as quickly as the situation requires.*

## How BSI can help

Standards matter. They contribute at least £2.5bn each year to the UK economy and play a key role in enabling innovation, improving competitiveness, increasing reliability, ensuring safety, improving accessibility, controlling quality, managing risk and improving business performance.

As the world's first national standards body, BSI British Standards has a globally recognized reputation for independence, integrity and innovation. Part of the BSI Group operating in 86 markets worldwide, BSI British Standards serves the interests of a wide range of industry sectors, as well as government, consumers, employees and society overall, to make sure not just British but European and international standards are useful, relevant and authoritative.

BSI champions UK interests at home and abroad and is an incubator of many of the world's leading standards. It is the national gateway to all the European and worldwide standards bodies promoting fair trade, technology transfer, economic prosperity and security.

Several publications describe the benefits of using standardization to achieve broader organizational and national strategic objectives. Information about these is available from BSI British Standards.

To find out more about how BSI can help you, visit the website at [www.bsigroup.com](http://www.bsigroup.com) or email [britishstandards@bsigroup.com](mailto:britishstandards@bsigroup.com).

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