



The Royal Academy  
of Engineering

# Strategic Plan

2005-2010





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# Introduction

To thrive in today's intensively competitive global environment, the UK needs highly talented people with a range of intellectual and technical skills, together with organisations and processes that can deploy them effectively.

The Royal Academy of Engineering exists in support of these needs, to promote excellence in the whole field of engineering and through it the sustainable enhancement of the health and wealth of our society and environment.

This Strategic Plan sets the strategic objectives and direction of the Academy for the five year period 2005–2010, but within a long-term context. It builds on the Academy's three enduring strategic priorities of:

- enhancing national capabilities
- recognising excellence and inspiring the next generation
- leading debate by guiding informed thinking and influencing public policy

The plan provides a focus for action enabling the Academy – Fellows and staff – to plan and prioritise our work. It gives us the means to measure our progress and impact and to explain to potential supporters the value that the Academy can bring to their own endeavours. Specifically, it outlines the role of the Academy and the values we uphold, it explains the context in which we work, identifies our strategic objectives and outlines ways in which each will be addressed.

A supporting Business Plan, prepared each year, will detail approved programmes and their allocated resources, anticipated outcomes and criteria for measuring impact.

# Our role and values

The Academy's leadership role derives from its Royal Charter, supported by its strong and multidisciplinary Fellowship which is drawn from Britain's most eminent engineers, elected by their peers and coming from leading positions in industry, academia and public service. The Academy is multidisciplinary in both nature and conduct, deploying the skills of its Fellows across a wide breadth of activity supporting public engagement, policy formation, education, research and industry.

Our vision is of a society that welcomes, values and has confidence in the advance of technology – a society in which ideas, knowledge and scientific discovery are exploited for the benefit of humankind.

Our mission is to use our leading position to help strengthen the contribution of UK engineering to sustainable wealth creation and quality of life.

The Academy's values set the standard of conduct for the Academy and for our programmes and schemes:

## EXCELLENCE

Commitment to excellence is at the heart of the Academy. Whether it is the eminence of our Fellowship, the professionalism of our staff or the aims of our programmes – developing, inspiring and celebrating excellence is what we do. We welcome constructive feedback to maintain and enhance our standards. As an employer the Academy invests in the professional and personal development of its staff, and as individuals we take pride in our actions.

## LEADERSHIP

The Academy leads the profession by virtue of the skills and distinction of our Fellowship. We employ this leadership actively, anticipating key issues, building effective relationships and working in collaboration with other organisations wherever appropriate, and exercising our influence and authority for the public good. We use our leadership position to act as a catalyst for others where they are better positioned and equipped for action.

## INTEGRITY

The Academy's interactions are characterised by mutual respect, openness and integrity. We show impartiality, fairness, independence and honesty, upholding the highest ethical and professional standards and behaving in an open and consistent way. Within the Academy, we work together, actively sharing knowledge to break down barriers and optimise our effectiveness. We endeavour to keep our staff informed on all aspects of the Academy's business and work hard to secure their input to our development.

# The context

The Academy operates in a complex political, social, technological and economic environment. Engineering knowledge, markets and supply chains are now global in nature and technology and skills are available and transferable all over the world.

UK engineers must be able, readily, to fulfil their role within enterprises of every nature in this international context and to recognise how engineering can be deployed to help steward the world's diminishing resources. It is important, too, to ensure a sustainable future for the practice of engineering in the UK, which is necessary to ensure the future success and profitability of industry and business; this in turn enables reinvestment in R&D and the provision of resources for wider societal objectives.

The creation of an environment conducive to innovation and wealth creation is high on the agenda of many nations. The UK Government has set its own strategy through the 10-year Science and Innovation Investment Framework, published in 2004, much of which builds on previous policy. But there are numerous challenges. For example, recent reviews have identified shortcomings in engineering R&D in the UK which could hold back technological competitiveness. The Government's aspiration for the level of R&D to reach 2.5% of GDP in 10 years would require a substantial increase in R&D expenditure, in industry in particular. It would also demand improved interaction between scientific and engineering research and between industry and universities, regionally and nationally. R&D and innovation are becoming more dependent on global networks whilst, in the UK, the roles of the Devolved Administrations and Regional Development Agencies are also growing in significance.

Alongside the challenge of creating the conditions for innovation is that of delivering the high technology products, services and infrastructure to society that result from innovation. Critical to this is the effective management of engineering projects, large and small, and the ability to integrate, innovatively, a range of technologies. This skill is central to the practice of engineering.

Society depends on technology in almost every aspect of daily life. The allocation of resources, whether public or private, to deliver technological solutions frequently requires choices between different, viable options. There is increasing recognition of the need for open, well-informed dialogue and engagement as part of policy formation if the public is to have confidence in resulting decisions. The engineering community needs to engage effectively if public concerns are to be anticipated and the value and potential of engineering more widely appreciated.

In common with many developed countries, the UK suffers from societal influences which predispose young people, particularly girls, against careers in engineering. The perception of engineering and the roles of engineers are often misunderstood. Competency levels in science and maths are lower than several competitor nations, some of which are developing at a remarkable rate and presenting a growing challenge to traditional UK strengths in science and engineering. Despite many educational reviews and initiatives, there is a lack of consensus on the education curriculum.

There are challenges in recruiting and retaining top-quality UK engineering graduates in engineering industry and a declining fraction of engineering research students originate from the UK (leading to some concerns of a potential shortage of engineering researchers and lecturers). There is also a view that industry in the UK undervalues the qualities of PhD graduates in engineering. The effect of student top-up fees, the proposed harmonisation of European engineering degree requirements (the Bologna Declaration) and growing competition from overseas universities present further challenges. Many organisations are engaged in Science and Society programmes to address some of these challenges, which are usually most effective when individual organisations work coherently with others to maximise impact and avoid a plethora of competing initiatives.

# Our strategic objectives

The focus of the Academy's Strategic Plan for the next five years is to build on our strengths, broaden our activity and increase our impact. We will focus our efforts through our strategic objectives for 2005–2010, which are:

1. to engage more effectively with the public and the public policy process
2. to attract more people to a wider range of engineering careers
3. to enhance the contribution of engineering to raising the UK's innovation performance
4. to strengthen the Academy and its ability to make an impact

Each of these strategic objectives is supported by a series of intended actions. Although not exhaustive, the list of actions is ambitious and indicates what we must do to deliver the objectives. It will also help us to measure and report on the impact we are making. The first three objectives are outward facing whilst the fourth sets out to ensure that the Academy is fit to deliver its mission.



# To engage more effectively with the public and the public policy process

## WHAT WE MEAN BY THIS

The Academy's public engagement activities contribute to delivering our vision of a society which welcomes the advance of technology. We provide opportunities for informed debate and for deliberation of issues of public policy, helping to deliver public confidence in resulting decisions.

In doing this, we must take a long-term, strategic view, anticipating emerging topics so that we can act quickly and effectively. We must promote debate and enable dialogue, and we must provide impartial, authoritative advice, drawing on the knowledge and experience of the Fellowship. By working in concert with other organisations, we can widen our audience and raise awareness of the real nature and value of engineering and its contribution to society.

## WHERE WE ARE NOW

The Academy has refreshed its visual identity as the first step in enabling better communication with younger people. We run a programme of events for specialist and non-specialist audiences which are focused on topical engineering issues. These often have a public policy component and are designed to challenge thinking and inform debate.

The Academy works actively to inform the public policy process both by responding to Government and Parliamentary consultations, and by initiating and publishing its own reports on important issues. An example of the inclusive approach we seek is the recent report on the social, ethical and regulatory implications of nanotechnology, undertaken jointly with the Royal Society and on the basis of broad consultation.

## HOW WE WILL DEEPEN OUR IMPACT

We will increase the scope and quantity of our public engagement activities in a coordinated and targeted way. Wherever appropriate, partners will be sought and other Science and Society activities supported to maximise our impact. We will seek to improve perceptions of engineering and to highlight its relevance to society and we aim to create an exciting and welcoming public space which highlights the excellence and scope of engineering.

We will pay particular attention to young people and those who influence them. In maintaining the high standards and impartiality of our policy activity, we will take a strategic, long-term view of major issues. We will engage more widely in the preparation of policy advice and its dissemination and will find effective ways of ensuring that our views inform public policy within the wider Science and Society debate.



**SPECIFICALLY WE WILL**

**Create an overarching public engagement programme:**

- Shape the Future – a campaign aimed at young people and those who influence them. Dedicated to raising awareness of engineering as an essential and exciting part of modern Britain. Supported by strategic partners. Launch autumn 2005
- develop our use of role models, including those in receipt of Academy awards. Enhance public profile of leading engineers
- strengthen our events and lectures. Launch a high profile, annual International Lecture in 2006
- develop strategic partnerships with related professions to highlight links with engineering, for example, in design, architecture and medicine

**Develop our communications activity:**

- increase exploitation of media channels not previously embraced to the fullest (e.g. television)
- plan for a dedicated, visible and exciting public space in which to exhibit the achievements and potential of engineering. Use it to help deliver the Academy’s message of the importance of engineering in our daily lives and to encourage the take-up of engineering careers
- launch a Media Fellowship Programme designed to improve the public engagement skills of engineering researchers and help them to identify in advance issues of future public concern
- optimise our public profile for each communication activity

**Launch the ERA Foundation Research Prize:**

- to recognise excellent research with strong

potential to meet a business/industry need. First award – June 2006.

**Enhance the impact of our publications:**

- increase the circulation of *Ingenia*, the Academy’s flagship publication, to influence a wider audience
- increase the appeal and usage of the Academy’s websites by target audiences, especially young people

**Strengthen further our policy work and the impact it makes:**

- increase engagement by Fellows and other expert individuals in informing debate on significant issues of the day. Ensure we identify and respond effectively to emerging topics and trends
- conduct up to eight significant projects per annum of topical public interest and relevance to the Academy’s strategic priorities. Generate and promote informative reports which raise the level of debate of the issues they address and the profile of the Academy. Aim for quality rather than quantity and to sustain work on issues of ongoing importance. Work with partners where appropriate including international partner academies
- policy activities will focus on five themes: engineering, society and the quality of life; sustainability and environmental management; engineering for wealth creation; innovation and R&D; and new and emerging fields of engineering
- foster interdisciplinary collaboration and undertake more dialogue with stakeholders and the public
- establish a leading role for the Academy in the debate on the societal implications of new and emerging technologies

# To attract more people to a wider range of engineering careers

## WHAT WE MEAN BY THIS

The Academy pursues excellence in the whole field of engineering within a broad definition which encompasses many aspects of science, design and technology. Awareness of the real nature of engineering and the career opportunities it provides is low and, in many cases, perceptions are negative. Students who do choose engineering have often been influenced by family role models or are attracted to it by a proposition which excites them. Engaging with students (and those who influence them) from a more diverse range of backgrounds improves our chances of attracting more talented people into the profession.

Our approach is to develop and sustain young people's interest in science, engineering, and technology and to enhance their understanding of engineering and the excitement it provides at appropriate stages of their education. We will use this approach to attract more young people to a wider range of careers than before – promoting the equal importance of engineering technicians, incorporated engineers and chartered engineers.

## WHERE WE ARE NOW

We work with partners in providing leadership of a wide range of nationally-based high-quality curriculum enrichment schemes in science and engineering which are brought together, on a significant scale, as the Academy's Best Programme. Through this, we inspire and engage young people in understanding engineering from primary and secondary schools through to student

gap year programmes and undergraduate and postgraduate schemes.

The demand for our schemes – from both students and schools – is strong and their effectiveness is high in terms of the proportion of students opting for a career in engineering. Our support to university education through the visiting professors scheme serves also to develop and sustain students' interest in the subject.

## HOW WE WILL DEEPEN OUR IMPACT

We will build on our leadership position to grow the Best Programme, seeking new partners and positioning it as the key national scheme for engineering education curriculum enrichment. We will develop an improved system of metrics to measure the impact we are achieving and to help target our work to greatest effect.

We will attract a new generation of engineers into a range of engineering careers by providing curriculum enrichment experiences in schools, by working with universities to help make engineering degree courses more vibrant and appealing and by emphasising the relevance and rewards of an engineering career.

The Best Programme will engage with a wider range of young people through carefully planned initiatives. We will focus on key groups including younger (primary age) children and we will aim to hold their interest at secondary level. We will develop our use of role models, recognising that this often influences students to choose science or engineering subjects.



### **SPECIFICALLY WE WILL**

#### **Build on the success of the Best Programme:**

- position it as the pre-eminent national scheme for engineering education curriculum enrichment. This will benefit students and teachers by making a single high quality offering appropriate to a wide age range
- operate it as a true continuum where participants remain engaged year after year, graduating from one scheme to the next
- aim to double the number of participants to 50,000 a year by 2008
- develop metrics for the quality and effectiveness of the Best Programme by 2007

#### **Widen the Best Programme:**

- focus on groups of students where the case for a career in engineering has not yet been made successfully, including prospective technicians
- work more in primary schools where early intervention can have a long lasting effect
- double our efforts to recruit more girls and women to the Best Programme. For many years only 14% of engineering undergraduates have been women and currently only 4.5% of engineering practitioners are women. Currently 25% or more of Best Programme students are female – we aim to increase this further

- engage more young people from parts of society that are under-represented in engineering including minority ethnic groups and students from families where there is no tradition for higher education
- a more diverse set of students progressing onto tertiary engineering education will result in a more diverse workforce – to the benefit of society and the economy

#### **Support our undergraduates:**

- assist undergraduates in their studies through financial support, mentoring and extra-curricular training
- develop new Best Programme offerings for undergraduates that are attractive and complement the teaching they receive from their universities
- aim to treble the number of undergraduate participants in our schemes by 2010

#### **Support our teachers:**

- work to improve the teaching of science and engineering in schools, colleges and universities by introducing teaching programmes that help teachers convey the excitement and relevance of engineering to their students
- aim to reach 3000 teachers by 2008

# To enhance the contribution of engineering to raising the UK's innovation performance

## WHAT WE MEAN BY THIS

Engineering knowledge and know-how contribute greatly to innovation across industry, business and the public sector. The future economic wealth of the UK depends on sustaining the innovation process. This demands receptiveness to fresh ideas, the development of excellent people to meet present and future challenges and responsiveness to competition worldwide.

The Academy has a responsibility, with its multi-disciplinary engineering perspective, to add value and momentum to the improvement of the UK's innovation performance. This includes: promoting demand for high-tech UK engineering; nurturing the conditions for success through promoting more two-way knowledge transfer between different organisations; and – not least – supporting the training and development of high quality engineers.

## WHERE WE ARE NOW

The Academy has developed sound links with counterpart academies in many other countries, with international benchmarking of innovation capability one important underlying consideration. Within the UK we have focused our attention on the training, development and mentoring of high quality engineers, notably in research – an essential foundation for future innovation capability.

Established programmes cover all areas of engineering and include, for example, Fellowships and Chairs that nurture the skills and interests of researchers at key stages in their careers and promote collaboration between industry and academia. These involve industry in co-sponsoring and fostering positions and progress. Academy schemes also enable networking between UK researchers and those in centres of excellence around the world.

## HOW WE WILL DEEPEN OUR IMPACT

In addition to building on our support for research and the development of those engaged in it, we intend to extend our ability to add value to the innovation process, engaging more closely with the needs of industry and business. We aim to work more directly in partnership with employers and with other discipline-based institutions.

We will seek to increase our work in helping to develop talented engineers in Small and Medium Sized Enterprises (SMEs) – key players in delivering future innovation performance. We shall pay particular attention to the implications for the UK of the increasingly global marketplace for ideas and wealth creation opportunities. We will further sustainable development by promoting best practice in engineering design.



### SPECIFICALLY WE WILL

#### Develop new approaches and programmes which stimulate:

- two-way knowledge transfer between different organisations in the UK, e.g. between universities and industry; between public enterprises and private businesses; and between investing institutions and technology companies
- awareness and demand for technology and engineering in business and industry. We will engage at regional level in the UK, including with the Regional Development Agencies
- linkages with other countries identified as key strategic partners for the UK

#### Promote:

- development and delivery of technologies of benefit to society
- maintenance of technological capability in strategic areas

#### Aid the innovation process with new targeted initiatives:

- a programme of Distinguished Visiting Fellowships in key disciplines to invigorate UK staff and students and share international best practices – target 50 fellowships per annum within three years
- a programme of fully-funded 10-year Research Chairs in Emerging Technologies, to be awarded at the rate of one per annum from 2007
- a pilot programme of two Industry into Academia Fellowships per annum from 2005–6

#### Work internationally to:

- establish a new scheme to support research exchanges with China and India as a first step in enhancing links and knowledge transfer with these growing world powers – target is 60 exchanges per annum within three years of start in 2007–8

- develop co-operatively new strategies with the European and world bodies of engineering academies (Euro-CASE and CAETS) to capitalise on their ability to play a stronger role in the international arena

#### Expand current programmes:

- RAEng/ EPSRC Research Fellowships – double in number to 66 over five years
- Research Chairs and Senior Research Fellowships – grow to a total of 30 over the next three years and to 42 over the next five years
- Visiting Professors schemes – expand to ensure that engineering graduates emerge with up-to-date skills required by industry. Increase the number by 5-10 per annum over the next three years and extend the scheme to new subject areas such as integrated system design and industrial design and innovation. Ensure that the more established posts become self-funded at a rate of 5-10 per annum
- Global Research Awards – increase to 16 a year over the next three years and maintain at this level
- International Travel Awards – increase by 50% over the next three years
- Industrial Secondments for university lecturers – increase by 25% within three years
- Engineering Professional Development Awards – grow this scheme by 30% in the next three years to increase support to SMEs
- Take up of Engineering PhDs by UK students – improve with a pilot scheme to be introduced with four awards in 2006, building to 15 a year within three years
- Explore how we might improve the accessibility and affordability of ongoing study to working engineers

# To develop the ability of the Academy to make an impact

## WHAT WE MEAN BY THIS

Delivering our programmes effectively and efficiently requires a robust Academy, supported by sufficient resources in terms of people, partners, premises, funding and infrastructure.

We must have the foresight to anticipate where our efforts are best directed, the skills to deliver and the agility to respond to changing circumstances and to address new areas as our priorities evolve. Our leadership position – which derives from the Fellowship, our staff and our commitment to excellence – must always be used for the public good.

## WHERE WE ARE NOW

A significant proportion of the Academy's Fellows are active in delivering the Academy's aims, supported by an experienced staff team and a wide network of partners. However, the make up of the Fellowship does not yet adequately reflect our diverse community: too few excellent female engineers have been elected and we need to work harder to identify high achieving individuals in SMEs and some major industrial sectors. The Fellowship is drawn from all parts of the UK but our activities tend to be London-centric.

Our premises are inadequate with insufficient space for our audiences or facilities for our Fellows;

they also lack a public space to convey the excitement and vitality of engineering excellence. We have high quality IT which we could exploit more effectively. There is a developing view among the Fellowship for a stronger role in support of capacity building in developing nations.

## HOW WE WILL DEEPEN OUR IMPACT

We will actively develop our leadership role, seeking out candidates for election to the Fellowship from areas of engineering that are inadequately represented. We will develop our network of partners and will strive to ensure that all aspects of our programmes, schemes and organisation work to widen participation from under-represented groups. We will engage more effectively at regional and local levels.

We will exploit our collective skills in the delivery of our programmes. We will review the options available and develop a more prominent role in support of international development (aiming to build it around current activities and programmes).

We will develop the Academy's infrastructure including our skills, property and IT systems. We will actively seek out new sources of funding to develop programmes in support of the Academy's charitable objectives. We will measure and report on our performance.



### SPECIFICALLY WE WILL

#### **Enhance the Academy's leadership role and reputation:**

- building recognition of the Academy as a multi-disciplinary, pan-engineering organisation which is representative of industry and academia at senior level and stands for excellence at all levels of the profession

#### **Strengthen the Fellowship:**

- identify more Fellows from SMEs, younger age groups and other underrepresented groups
- develop better means for communicating with the Fellowship
- maximise ways in which Fellows can participate in Academy activities and make more use of International Fellows

#### **Increase partnerships and networking with stakeholders:**

- establish high level dialogue with current and potential stakeholders, establishing partnership agreements on specific projects
- develop improved means for communicating with the participants in Academy initiatives

#### **Encourage diversity in all that we do:**

- ensure that we have objectives for widening participation in our programmes and set up schemes aimed specifically at target groups – monitor against these and take action where they are not being met
- participate fully with national bodies seeking to promote diversity

#### **Develop the Academy infrastructure:**

- acquire premises that would enable the Academy to fulfil its national leadership role in promoting and strengthening engineering capability and excellence over the long term

#### **Ensure sufficient and balanced funding:**

- extend and diversify our sources of funds by launching a broadly based fund-raising appeal in 2005 which initiates the long term development of a range of mutually valued relationships with businesses, foundations and relevant public sector sources

#### **Widen our reach:**

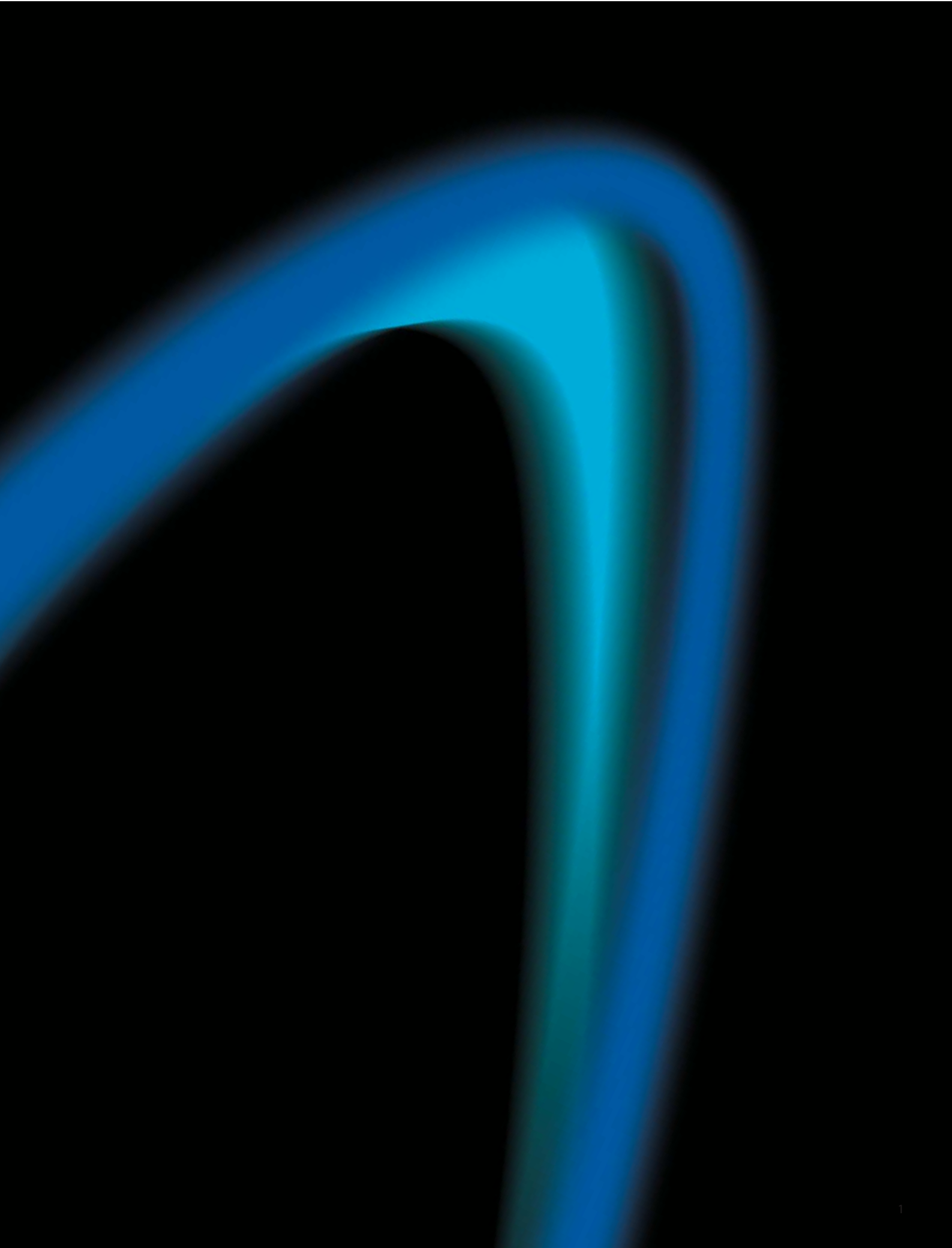
- increase regional activities to develop a balanced national footprint

#### **Consider engineering capacity building opportunities:**

- establish how best the Academy can support capacity building in developing countries by end 2006; complete consultation and funding case by end 2007; and roll out pilot programme between 2008 and 2010

#### **Improve the Academy's performance and processes:**

- use technology to reach a wider, more diverse audience
- re-engineer and improve as many activities as possible using IT
- enhance skills levels throughout the staff team to meet evolving demands and obtain and retain Investors in People status
- measure and communicate the impact of our work



# The Royal Academy of Engineering

As Britain's national academy for engineering, we bring together the country's most eminent engineers from all disciplines to promote excellence in the science, art and practice of engineering. Our strategic priorities are to enhance the UK's engineering capabilities, to celebrate excellence and inspire the next generation, and to lead debate by guiding informed thinking and influencing public policy.

The Academy's work programmes are driven by three strategic priorities, each of which provides a key contribution to a strong and vibrant engineering sector and to the health and wealth of society.

## Enhancing national capabilities

As a priority, we encourage, support and facilitate links between academia and industry. Through targeted national and international programmes, we enhance – and reflect abroad – the UK's performance in the application of science, technology transfer, and the promotion and exploitation of innovation. We support high quality engineering research, encourage an interdisciplinary ethos, facilitate international exchange and provide a means of determining and disseminating best practice. In particular, our activities focus on complex and multidisciplinary areas of rapid development.

## Recognising excellence and inspiring the next generation

Excellence breeds excellence. We celebrate engineering excellence and use it to inspire, support and challenge tomorrow's engineering leaders. We focus our initiatives to develop excellence and, through creative and collaborative activity, we demonstrate to the young, and those who influence them, the relevance of engineering to society.

## Leading debate

Using the leadership and expertise of our Fellowship, we guide informed thinking, influence public policy making, provide a forum for the mutual exchange of ideas, and pursue effective engagement with society on matters within our competence. The Academy advocates progressive, forward-looking solutions based on impartial advice and quality foundations, and works to enhance appreciation of the positive role of engineering and its contribution to the economic strength of the nation.



The Royal Academy of Engineering promotes excellence in the science, art and practice of engineering.

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