

St George's House 30th Annual Lecture
Monday 2 June 2008

THE BRAINS TRUST:
UNIVERSITIES AND THEIR NEW RELATIONSHIP WITH SOCIETY

Your Royal Highnesses, your Excellencies, Distinguished Guests, Ladies and Gentlemen, Mr Dean and Mr Warden.

I thank you and the Trustees for the great honour of giving the St George's Lecture this year.

A couple of years ago, a director of Intel made a very telling statement:

"Microchips," she said, "Are made of just two things: sand and brains. We have plenty of the former but a diminishing supply of the latter."

My central theme today is that Universities are critical to society in the 21st Century, because they nurture and supply those brains.

Keyhole surgery, IVF treatment, MRI scans, Holograms, Solar panels, and even the Swingometer, all these exist because of the brains in British universities.

In my career I've been fortunate to work in both industry and academia. I've seen both sides working together to improve quality of life and do real good for society. I'm convinced that now is the time for a new relationship between universities and society to take root and to be more widely recognised.

I'm delighted that St George's House asked me to talk here on this subject. You should be applauded for your recent focus on higher education, which has been examined in partnership with a range of bodies. St George's will also meet later this year to discuss a topic I shall touch on, that of scientific education.

I want to reflect on what universities are for. This is a question that doesn't get asked in this country often enough. For a country that has a dynamic range of universities, and contains a number that are indisputably world class, that is strange. I'd like to explore the nature and purpose of a university. Who is it for? And what is it for?

Today I will argue that universities occupy a pivotal position in society. They carry out research, they create knowledge and they strive to turn that knowledge into action. They work with philanthropists, industry, business, governments and the church. There are new roles for all these partners, which I shall discuss in more detail later.

But first I should explain my title this evening: What does the 'Brains Trust' mean? Well originally it was the name given to US President Franklin Roosevelt's 'wise men', a gang of advisors, economists and professors who played a key role in shaping the 'New Deal' in the early 1930s.

Then, as some of you may recall, the Brains Trust was the name of a popular BBC radio, and then TV programme which began in the 1940s. However I want to adopt 'Brains Trust' for the amazing asset that we have in the UK. We must collectively harness and nurture the knowledge base, so that universities can interact with society more completely than before.

Universities have persisted for a very long time. No University that has received a Royal Charter has ever gone out of business. Imperial College celebrated its 100th birthday last year; next year Cambridge will celebrate 900 years.

The first chancellor of the University of California Berkeley, Clark Kerr, said that universities and the Catholic Church are amongst the most enduring features in Western civilisation.

Of the top 500 companies in the American Standard and Poors Index in 1950, just 74 are there today. By contrast, all British universities created since 1945 are still in business.

However longevity is not of itself, an omen of good health where universities are concerned. While Oxford and Cambridge stand out as long-term performers – or survivors – there are plenty of continental universities of similar vintage in poor health.

Kenneth Baker observed ominously, in 2000, that

“When great institutions decline, they do not decline precipitously: there is no precipice. They simply decline very slowly. Higher Education in this country,” he said, “is now heading down that slope.”

Since he spoke much has transpired to render the outlook for UK universities more positive. But his words serve as a caution: we must keep checking on the health of our universities and not hope that small dips are simply ‘background noise’.

For many hundreds of years, universities have served as communities of scholars for the select few. Before 1960, less than 5% of the age group would go to one of 40 universities in the UK. In the last 40 years we have seen an explosion in the number of universities and the number attending them. Some 43% now go to one of about 150 universities.

Organised research, in the way that we understand it today, did not become a feature of universities until the middle of the 19th century, when German technical universities led the way. They did this in comparative isolation from the rest of society – in the famous academic ivory tower.

But today most universities want to play their part in modern society and do not wish to be isolated. They recognise they are critical in a range of ways.

These include:

Addressing global challenges

Wealth generation

Tackling social inequalities and improving quality of life

Fostering better understanding between cultures

Producing the next generation of leaders

Such engagement with society was not always apparent or indeed true. But today the economy relies on knowledge – and where is that knowledge to be found, if not in the universities?

The brilliant but chaotic researcher Sir Alexander Fleming first saw signs of anti-bacterial activity in mould-covered culture dishes in his lab at St Mary’s Hospital Medical School, now part of Imperial College.

His chance discovery was later developed by a team at Oxford University under Sir Howard Florey, and mass-produced in the USA just in time to save many lives during World War II. Penicillin, in its various forms, continues to be vital to the treatment of life-threatening conditions such as meningitis, pneumonia and septicaemia.

Penicillin's serendipitous discovery is one of the great stories of modern medicine. It also highlights the fundamental role that universities play in pushing forward the breakthroughs that save and improve countless lives.

In the pharmaceutical industry most drugs used to be discovered that way. However with the great advances in science and technology, today drug discovery is driven by a basic understanding of the molecular mechanisms of disease, and drugs are designed based on that knowledge.

To be part of the knowledge economy, one that is driven by data, facts and insight, you have to identify where knowledge is bred and nurtured. The answer is: in Universities.

University science can and does undertake the speculative, blue-skies research that underpins the innovations the world relies on. What has changed is that today we don't rely on chance.

Research universities are traditionally viewed as the place where we discover and understand the answers to the really big, fundamental questions of human existence.

For me that means understanding the existence of dark matter in the universe.

Or understanding what messages lie within the sequences of the human genome.

Or understanding the nature of consciousness.

Or, discovering the so-called God particle, the Higgs Boson.

This is where the thirst for knowledge drives academics onwards, simply because they are desperate to find the answers.

It's thrilling because they never quite know where their quest will lead them. It's knowledge for knowledge's sake, and in this environment there are no vested interests beyond those generated by ego, rivalry and the desire to be the first.

You need to let these people be free and essentially to do what they want. There's no other way to operate without quashing the essential creativity – something that is more often linked with the Arts, but which is a core ingredient of all scientific endeavours.

This description of a traditional university sounds a lot like an ivory tower – and in a sense that is true. But it's no longer the whole picture of what a university does, as I shall explain.

Increasingly research is done collaboratively, and often on a huge scale. Take the European particle physics laboratory, called CERN. This is home to the world's biggest and newest particle accelerator, buried underground outside Geneva, known as the Large Hadron Collider.

In the next few weeks, it will be switched on, and the largest experiment in the world, seeking the smallest particle in the universe, will begin. This could not have happened without the collaboration of over 7,000 scientists, 580 universities and 85 countries.

Scientists anticipate an explosion of new insights into the origins of the universe, including the discovery of the particle I mentioned earlier, the Higgs Boson.

Thousands of powerful superconducting magnets steer two proton beams around a 27-kilometre ring in opposite directions at speeds close to 300,000 km/second; that's 99.99999% of the speed of light. The protons will lap the circuit 11,000 times a second, and are then focused to the width of a human hair, before smashing together.

The head-on collision generates so much energy that the protons disintegrate. This gives rise to the most fundamental components of matter, believed to have existed for a fraction of a billionth of a second at the time of the Big Bang.

CERN's instruments are breathtaking. The engineering feat to make the experiment has been truly astounding. The detectors capturing the information from this experiment are housed in underground rooms the size of this Chapel, and are packed with the most sophisticated electronic detection systems.

Data from the experiment will be accumulated at an incredible 1 TeraByte every second. To put that in perspective, the UK National Archives contains 900 years of written material, which amounts to 600 TeraBytes of data. Just one detector at CERN will generate that much data in about 10 minutes.

The handling of such vast amounts of information generated in these experiments requires some sophisticated and powerful storage, retrieval and communication tools. It was this need to organise

information at CERN in the late '80s that led to a development that has changed the life of pretty much everyone on earth– the World Wide Web.

We have no idea where fundamental research might take us, and in a sense we shouldn't try to predict it. Many illustrious figures have stumbled when attempting to do so. In 1956 the Astronomer Royal suggested that 'space flight is hokum', and in 1945 the Chairman of IBM stated that at the most 'there is a world market for fifteen computers'.

John Pendry, a researcher in optics at Imperial, has recently made theoretical breakthroughs in developing materials that could form a "perfect lens" and, by the way, to make Harry Potter-like "invisibility cloaks".

He was asked if he had thought about how one might commercialize these so called 'metamaterials'. With modesty, he said he would be pleased to leave the exploitation to the people who have much greater competence.

He then made the analogy to the first days of the laser:

"When the laser was developed" he said, "People asked the usual question, "What is it going to be used for?" Scientists gave the best answers they could. Now it's 40 to 50 years since the first laser, and the things that are done today would astonish the inventors."

That captures something about the importance of the basic sciences which it behoves us to protect at all costs.

Winston Churchill, receiving an honorary degree from Harvard in 1943, said:

"The empires of the future will be empires of the mind."

Sixty-five years later we are living in the world he foresaw. It's a place where knowledge puts us on course to a brighter future, and economic advantage stems from investment in knowledge based activities, namely education and research.

In universities in recent years this has led to a drive to translate scientific, engineering and medical research into exploitable goods, services or therapies. Knowledge transfer offices, financial encouragement for academics, and arms-length patenting and exploitation companies are routinely seen.

Universities are ideas factories but they need relationships with industry to develop those ideas and take them to market. There is a push and a pull at work here because business and industry simply cannot build up the kind of research hub to be found in a university.

Companies recognise that they can't do in-house the kind of work that a research-intensive university can, especially in multidisciplinary areas.

That's why today we have multi-million pound, long-term relationships with companies such as Rio Tinto, BP, Shell and GSK. We are doing their basic, fundamental research, and it is literally going to give them the future technologies which provide the competitive edge.

University spin out companies are increasingly a safe bet, with higher survival rates than the average for new technology companies. The Gatsby Charitable Foundation reported the failure rate from 10 UK universities was less than 10%. This compares with an average of 60-70% among high-tech companies.

And David Sainsbury's landmark report on science and innovation last year, called 'The Race to the Top', revealed that in the past three years, 25 spin-outs from UK universities have floated on stock exchanges, raising over £250m at the initial public offering stage. These now have a market capitalisation of over £1.5bn.

In recent years we have become very familiar with the knowledge economy agenda; Thomas Friedman's book 'The World is Flat' explains what it means to live in a globalised, technologically-driven society.

The 'flattened world' he describes refers to a levelled international 'playing field', which, thanks to technology and telecommunications, allows all-comers to compete in.

However, if the flat world is a recent rhetorical device, the principle underlying it has been known since at least the 19th century. Lyon Playfair, the former MP and professor at one of the forerunners to Imperial College, recognised it in 1852 when he said:

"As surely as darkness follows the setting of the sun, so surely will England recede as a manufacturing nation, unless her industrial population become much more conversant with science than they are now."

What he said over 150 years ago is even truer today. Much of our progress depends on fuelling the ongoing scientific revolution. Every day in universities we see new developments and new breakthroughs which, in turn, lead to innovations, which are the engine driving our economies. In the United States, Nobel Laureate Robert Solow has estimated that 50 per cent of their economic growth since the Second World War can be attributed directly to science and technology. If we want to compete in a global economy, we cannot forget this.

Here I want to highlight a relatively new feature of university life today – the world of league tables. Over the last five or so years, 'global rankings' of universities have begun to appear in the media. In various ways they have upset, confused and even bemused vice-chancellors.

They simply reflect our times. They are useful because they signpost the role that higher education now plays in the global economy. They also reveal that Universities are in fierce competition with each other, as Timothy Garton Ash (a previous St George's Lecturer) wrote last week describing the academic 'transfer market':

"It is as much a global market as that for computers, oil or financial services," he said.

What is clear is that once they appeared, presidents, prime ministers and chief execs would use them. And each would wish for a university in their back-yard capable of reaching the top spots.

Not for the boasting rights it gives them, but because they know their future lies in education and research, in putting cutting-edge science and technology at the heart of their economies and their businesses. Among science ministers and advisers there is absolute consensus on this. As mathematicians would say, it has become axiomatic.

The twenty-first century will confront the world with some of its greatest ever tests. Now and for the foreseeable future, the global challenges facing the world are hugely complex.

For example, reducing climate change and mitigating its consequences.

Sourcing sustainable energies, and coping with depleted natural resources.

Improving public health and containing potential pandemics.

Understanding better how the cells in our body work and interact with each other so that we can start to prevent disease rather than just treat the symptoms.

What these major challenges have in common is that they cannot be solved by scientists of a single discipline, a single institute or a single country alone.

They require the harnessing of brain power on an international scale. An array of tools and techniques is needed to tackle them. It will take a 'critical mass' of researchers to solve them.

Today physicists and chemists are just as important as molecular biologists on the front line of cancer research.

Engineers, computer scientists and clinicians are collaborating on technology that lets us see deep into our bodies, and observe why they go wrong.

Scientists of many expertises come together to develop new low-polluting fuels and find innovative responses to growing concerns such as national security.

To flourish in this type of world, universities have to run as hard as possible away from the ivory towers, and towards other organisations.

Medicines for Malaria is a great example of how universities, governments and NGOs can work together to make a difference. It aims to develop and deliver affordable drugs to fight the devastating effects of malaria.

It is funded by organisations such as the Gates Foundation, the World Health Organisation, the World Bank, and many national governments and pharmaceutical bodies. It combines the benefits of both the public and private sectors to enormous strength.

In another direction, we have turned our attentions to solving a different problem. The UK is rated 2nd in the world (to the United States) for its biomedical research; but 18th in the world for its quality of patient care. To address this Imperial College has just begun formal involvement in managing hospitals and delivering healthcare.

One of the greatest missed chances when the NHS was created was that discovery and innovation were institutionally divorced from patient care. It was a huge mistake to separate hospitals and universities so far.

Medicine has changed dramatically in the years since. Today the practice of medicine is not a social activity but one driven by science and technology. Today's doctors need data and facts to drive their healthcare practice. In a way, mathematics is becoming more important than anatomy. In that environment it makes no sense to separate treatments from training and research.

So Imperial's vision for organising healthcare was born. Our solution is based loosely on the model adopted in the United States. The Principal of our medical Faculty is also the Chief Executive of Imperial College Healthcare NHS Trust containing four major London hospitals. We are calling the concept an Academic Health Science Centre. We hope in due course that there will be more such Centres in the UK.

So far I have focussed on the relationship between universities and industry. Before I address education, I would like to say a few words about the relationships with Philanthropists, the State, and the Church.

The generosity of the new global Philanthropists is going to be vital in this new relationship. We are now seeing a new wave of active donors. Like their Victorian forefathers, they wish to see their wealth do good. They share a profound sense of social duty and a global concern for the betterment of lives everywhere.

The Bill and Melinda Gates Foundation is a well-known example. Jeremy and Hannelore Grantham, who in the last year have provided £24 million to establish two Climate Change Institutes, at Imperial and the London School of Economics, are another.

When personal wealth and a sense of global responsibility go hand-in-hand, the difference it can make is enormous.

In Britain we do not have the same culture of philanthropy as in the US. The gap between the ten largest university endowments in the UK and the US has widened by £12.5 billion in three years, according to the Sutton Trust. I believe that has to change.

There's plenty of potential for philanthropic giving in the UK. In 2007 the UK was placed third in the world listings of millionaires with a total of 610,000.

One of the most important gifts the State can give its universities is autonomy. It is not funds from the state but freedom that we most need.

Largely speaking, we are better off in the UK than the rest of Europe where many ancient universities have struggled for decades, even centuries.

It has become orthodoxy to look to the knowledge base to propel economies forward. But governments repeatedly demonstrate that they don't really understand what that means. They often insist on asking universities to compete with one arm and a leg tied behind their backs.

Great universities, like other institutions, derive strength from their autonomy. Government, business, media pressure, students and research sponsors all may and should influence university thinking. But the greatest contribution to society will be made by remaining independent and taking the long-term view.

When Oxford announced its new fundraising campaign last week, its Chancellor Chris Patten remarked that universities, as "great bastions of civil society" should be allowed to get on with running their own affairs. Indeed, autonomy and independence from state funding go hand in hand.

Deep connections already exist between the Church and universities. Things have changed an enormous amount since Charles Darwin feared to publish his views on the Origin of Species for worry of a religious backlash.

By contrast today, the Church has a more comfortable relationship with scientific knowledge.

The latest news from modern science, cosmology for example, is absorbed by spiritual leaders and probed to see how it may fit with their beliefs. Fertilisation and embryology research, on the other hand, continues to attract the opprobrium of certain groups.

However the influence of religious leaders can, and long has been, used for great practical good. They have a significant role to play in helping knowledge advance. Last year for example the Environment Agency ran an experts panel to list 50 things the public could do to save the planet.

Number 1 on the list was to use less power. To turn off lights, not leave appliances in standby mode and so on. But surprisingly, Number 2 was a call to religious leaders to make the planet their priority and to mobilise action around green initiatives.

Because it forms the main plank of this new relationship with society, I've so far been discussing a university's research mission. Now I want to talk about its educational role. In recent years this has been subject to confusion, between the meanings of education, and training.

For some time, it has been difficult to understand some of the government's intentions for higher education – especially around the role of employers.

When employers talk to me as a vice-chancellor, I know they understand what skills they want from graduates. That is called training. But employers are less clear about what education their graduates should have.

Education is an ability to solve problems, to be able to play a part in a democratic society. It leads to a way of thinking.

Cardinal Newman, in his 'Idea of a University', argued for knowledge not merely:

as "a means to something beyond it...but an end sufficient to rest in and to pursue for its own sake."

As the phrase goes "Education is what is left, when you've forgotten all you have been taught."

However much we may want to believe otherwise, people are not the same with respect to their abilities, whether that's a result of their genes or their environment or usually both. What can be the same is the desire for us to help people always reach their maximum potential, whatever that is. We must always strive for equality, but equality with choice, and not with uniformity.

It's the role of a university to create an environment for bringing out that talent; but it isn't the role of a university to do it for everybody. I said 'a university' because we recognise the plurality of tertiary education available today.

On the other hand, if you are trained to do something without having an education you don't have the same flexibility. Of course this is not completely cut and dried: when you get trained you also get educated. It is a question of the mix.

So we should resist forcing universities into a training role: Higher Education will only be weakened in the contribution it can make. Higher Education is already (and I don't mean it pejoratively) too much like Further Education. Higher Education should stay where it is.

The risk for universities is obvious – that they become the training arm of business, doing what business should be doing for itself.

The age-old distinction between education for life and training for a job is as relevant now as it ever has been. My university does not teach its students to change light bulbs, but to design better ones. Universities are not the training department of GlaxoSmithKline or Rio Tinto. I'm not saying we do not have a role; just that it is not our mainstream role at undergraduate level.

We should not forget that one of the best, certainly the cheapest knowledge transfer routes available to business is the employment of good graduates, especially PhDs, who come with state of the art knowledge and skills.

I have seen that if anyone is going to be 'constructively disruptive' to your business, then it will be PhD graduates from good research universities. They are the people who will change the business model. They are the people who will innovate, who will do the new things that a company needs to stay ahead.

Being an international organisation means recruiting your members internationally. This has obvious social and cultural as well as intellectual benefits. Almost half our students at Imperial originate outside of the UK as do the majority of our new academic and research staff.

The international flow of scientific talent is now a less over-wrought topic than in the past. Too much has been made of the 'brain drain'. As the former prime minister of India, Rajiv Gandhi put it:

"Better to have 'brain-drain', than brain in the drain."

Today, 'brain circulation' is nearer the mark. Many academics who leave these shores eventually return, and in many cases they come back brighter and better. The holes they leave are filled by other great researchers. These days, good people don't stay in one place forever.

Being in the Brains Trust means not sealing your knowledge away in a vacuum. Our role as an honest broker gives us an independent voice in contemporary debates. Universities need to maintain our portfolio of trust with society, so that our views are listened to and our knowledge is recognised as uniquely unbiased.

The recent parliamentary and wider public discussion over the Human Fertilisation and Embryology Bill demonstrated this. Many academics rolled up their sleeves and got involved with presenting the case for why society needs this research.

My colleague at Imperial, Robert Winston, helped to show a real lead to the scientific community on this. As a leading scientist, doctor and communicator, and now professor of science and society at Imperial, he has great experience in this area. He thinks that now is the time for researchers to take a long, hard look at how they are presenting themselves to society. Scientists do not own science – it is paid for by our society. I agree with this diagnosis.

We have to speak the same language as our audiences. It is no use as academics spitting out undigested jargon to the public. It takes a long time for views to change, but universities and their staff and students need to play their part in changing them, and not be isolationist. It's not easy.

It starts with understanding society and leads into the realm of morals and ethics, away from scientific knowledge. In terms of their relationship I am clear that science and moral judgement advance human progress together; scientific innovation is the motor, judgement the driver. Judgement is required as to how to use the discoveries and how to direct their application.

Science without judgement can be dangerous, just as progress without science is unlikely. How that judgement is understood and interpreted is critical – by scientists particularly.

Scientists by and large understand the importance of the 'court of public opinion'. But they need to act on that understanding and engage in the debates, not be bystanders.

David King, the former chief scientist, challenged the scientific community last year to adopt an ethical code. This is intended to cement a trusting relationship between scientists and the communities and individuals they serve.

It lists 7 principles for scientists to follow:

- Act with skill and care, and keep your skills up to date
- Prevent corrupt practice and declare your conflicts of interest
- Respect and acknowledge the work of other scientists
- Ensure that research is justified and lawful
- Minimise impacts on people, animals and the environment
- Discuss issues that science raises for society
- Do not mislead; present your evidence honestly.

As I have suggested, the critical element in the knowledge economy is universities. For a range of reasons they contribute more than any other agency or institution to its success. But what if their own supply chain is broken or moribund? Universities are principally fed by secondary schools so are intrinsically concerned by what is happening in them.

To have a knowledge economy worth speaking about we have to encourage and energise the debate in secondary schooling. We cannot not do their work for them, but we should set their sights higher, and help children aspire.

This is a big agenda in the UK. It typically goes by the name of “Outreach” or “Widening Participation”. It essentially means working inside and alongside schools to increase the aspiration for school children to go into Tertiary education.

For example, the greatest challenge of all is to prevent the world from self-destructing through irreversible climate change. This challenge should excite the young. Not just so that they can appreciate what the effects of climate change are, but also so that they can do something about it. The young will have their own ideas about what is needed.

Our budding scientists, first need to understand the under-pinning mathematics, physics, chemistry and biology. The intellectual challenge is great and should not be under-estimated. But the reward for them as well as for humanity is immeasurable.

The period between July and September is anything but sleepy at Imperial College. During that spell, we run 70 different summer schools, for over 3,500 students aged 11 to 16. Workshops cover alternative energy, robotics, the science of crime scene investigations, and the relationships between chemistry and art. It's a big commitment by our staff and we partner with a wide range of organisations to achieve it. We could not do it alone.

Last year I spoke to our graduating students and said that I feared that they were an endangered species. I was not trying to frighten their parents, but draw attention to the fact that year on year, the number of young people in the UK studying science past the age of 16 decreases.

Overall the trend is downwards for GCSE, A-Level and Undergraduate degrees in the sciences and mathematics. Just as the world's problems are getting more difficult to solve, fewer people are attracted to study science.

Increasingly, those with a drive for science and the education to back it up are coming from outside the UK. As I've mentioned before over 40 per cent of the students that Imperial teaches are not UK citizens.

Some will stay here, but many more will return to their home countries, which will be enriched by their abilities. If we can not nurture similar abilities among UK students we are going to squander their talents and the rewards that could be reaped for all of us.

We need to find ways of enthusing them. We need people who can go out and talk about their subjects with passion. We need evangelists.

A role for today's scientists and engineers, and their institutions, is to find imaginative ways to bring the young into their endeavours.

To tell of the mysteries of the natural world that are yet to be fully understood.

To talk about the technologies that will save the planet.

To show how much that is currently science fiction, can be turned into science fact. And that it can be them who play the starring role.

The process of nurturing scientists of the future starts in schools, and here I think that it is young researchers who can play a role.

At Imperial over the past five years we have been running a novel scheme that puts these researchers through teacher training for two years alongside their lab-based careers. They spend half their time

assisting with science teaching in specialist schools and studying for a teaching diploma. They spend the other half doing scientific research. The scheme is funded by GlaxoSmithKline and Imperial itself, and appropriately, is called INSPIRE.

Our evaluation indicates that schools do indeed see the postdocs as an inspirational resource and see measurable results for their pupils. Improvement in GCSE results and coursework and an increased uptake of A-level science courses have been noted.

Schools benefit enormously from these advocates for science and their knowledge of research. The postdocs act as role models for students and as experts on-call for the teachers.

Unlike similar schemes, an INSPIRE postdoc spends many months in the same school, thus developing relationships with students and teachers. To date, half of the postdocs have decided to make teaching science in schools their career.

I shall end by returning to my beginning. To borrow from Clark Kerr again, I hope that I've explained why a university is more than "a series of individual faculty entrepreneurs held together by a common grievance over car parking".

But when we're not arguing about domestic details, and we look to the bigger picture, we realise that we have to balance scholarly meditation with outward looking behaviour. It means finding a way to combine academic brilliance with the common touch. We need clear-sighted discussion, to acknowledge that engaging with society is part of our job.

I would like to praise the Queen's Anniversary Prize which is a great reward for universities that contribute in this way. Analogous to the prestigious Queen's Awards for Export, they recognise the contribution that universities make to the intellectual, economic, cultural and social life of the UK.

This year Imperial was honoured to receive the award, for our Schistosomiasis Control Initiative. This is an incredible project that has administered over 43 million treatments, and cured over 20 million people in sub-Saharan Africa of a debilitating tropical disease. It is vital not just to the well-being of individuals but also to the future of an entire continent. Organising its work was something that, perhaps surprisingly to you, a university was uniquely placed to carry out.

Universities remain, at heart, a community of free-thinking scholars and teachers. But they are today essential for wealth generation, addressing global challenges, tackling social inequalities, fostering a better understanding between cultures, training leaders and pushing the boundaries of knowledge.

In summary, a modern first-rate university is ideally suited to lead society in the 21st century. The ivory tower has been demolished. Let's recycle the bricks, and build a new meeting place for society.

Shaping the role of universities in the 21st century demands vision and a grasp of what needs to be done in the world.

Above all it requires leadership and an ability to strike new partnerships.

There is a great responsibility on all of us. And we will look to you in this Chapel to help us come to the right answer, for you are now part of the Brains Trust too.

Thankyou.