University of BRISTOL

Review of the year
2012-2013

Welcome

It is always difficult to capture in such a publication the essence, energy and sheer excellence that underpins a university like Bristol – its leading-edge research, its highly talented and driven students and staff. This is no easy task and I hope that we have managed to convey perhaps a snapshot of what, in my view, makes Bristol such an exceptional university.

The higher education sector has recently gone through and is likely to continue to experience turbulent times. It is how universities deal with the challenges placed before them that says something about their character and capabilities.

Bristol is well placed to respond to the various challenges and opportunities in equal measure and, as I hope you will see in this publication, is thriving against one of the most challenging backdrops this sector has known.

Within this publication you will get a glimpse into the vast array of world-leading research carried out at Bristol. Our research activities cover a broad range of subject areas and our cross-disciplinary research is addressing some of the world's most significant issues, while our interaction with business and other communities has significant impact on economies and people's wellbeing.

We also continue to innovate in the way that we educate our students so that they are best equipped to thrive in their chosen careers and, of course, we have exciting and significant estates developments to ensure that we provide the best research and educational environment for our academics and students.

Welcome to the University of Bristol's Annual Review.

Professor Sir Eric Thomas
Vice-Chancellor

Contents

The latest University Annual Report and Financial Statements are available at www.bristol.ac.uk/finance/statements/

Our research

Arts & Humanities // Social Sciences //
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The University's research is world renowned for its quality and impact across a broad spectrum of disciplines. We tackle some of the world's most urgent issues head-on: issues such as health and disease, climate change, food security, energy and social justice. Our academics are also engaged with the cultural life and history of nations, communities and individuals across the world; with the future of technology, science and medicine and the development of innovations in every field; and with the rich cross-pollination made possible by interdisciplinary fields such as nanotechnology, quantum cryptography, composite materials, stem-cell engineering and complexity science.

Our ambitions in this area are to:

// be recognised globally for the quality of our research

// create a positive research environment and infrastructure that will attract and retain a diverse body of the highest-quality researchers and postgraduate students

// develop our portfolio of flagship and high-impact research, working across and between disciplines to answer important societal questions and contribute to the social, political, environmental and economic wellbeing of the region, the UK and the wider world

// seek, manage and provide professional support for strategic relationships and alliances with key national and international partners – business and industry, the public sector, user communities, sponsors of research and policy-makers

// play a leading intellectual role in enterprise, knowledge exchange and economic and social impact agendas, and continue to be a beacon of good practice and leader of innovation in the city and region

// develop a sustainable portfolio of research informed by evidence-based leadership, management and administration and supported by high standards of governance

// Our research

Arts & Humanities

// The Arts and Social Sciences Library

A giant leap for literature

The University has collaborated with a developer of location-based apps to give classic literary texts a 21st-century twist

From handwritten texts to the printing press, digital publishing and e-readers, books and printed materials have constantly evolved through time. As publishers search for new and innovative ways to tell stories, this evolution continues through the use of new technologies. But the question is how can these new technologies enhance our reading experience and offer the reader something more than their physical counterpart?

A University of Bristol project, led by Dr Bradley Stephens, a senior lecturer in the School of Modern Languages, set out to answer this question as it explored books and print as historical, contemporary and future phenomena.

The project, called The Next Time(line), brought together Dr Stephens and Alex Butterworth, founder and creative director of Amblr, a developer, producer and publisher of location-based experiences.

Working with three classic literary texts – *The Prelude*, *Les Misérables* and *Henry V* – they created Timelines, an application that allows readers to explore historical, biographical and contextual information about an author or book through the use of a dynamic and malleable timeline. Using interactive data visualization for a touch screen tablet, Timelines places the text in a historical context, taking the reader into the moment it was written in order to gain a deeper understanding of how the work was created.

“There’s a long history of graphic timelines – events taking place in sequence,” said Butterworth. “This is more about what happens in relation to other things. It’s about understanding how one event has an impact – for example, the mind of a writer at a particular moment. It’s about taking people into that instant and surrounding them with information that allows them to understand a time outside their own.”

“What Timelines offers us is the chance to visualize text and the relationship between spots of time within and around a work,” said Dr Stephens. “It gives us a more interactive relationship to history and understanding of the way in which events and facts don’t just follow in a linear fashion but in fact have a much more sophisticated relationship to one another.”

The project was one of eight commissions that formed part of Books and Print Sandbox, produced by iShed as part of the Sandbox Programme and funded by the REACT Knowledge Exchange Hub for the Creative Economy.

Each collaboration received funding from the Arts and Humanities Research Council of £50,000 for the academic partner, including up to £10,000 to the creative economy partner, and was developed at the Pervasive Media Studio, Watershed, Bristol.

Theatre Collection continues to grow

The University of Bristol Theatre Collection was founded in 1951 as a research resource for the University's Department of Drama and the wider Bristol community. Since then, it has expanded and developed to become an Accredited Museum and theatrical research centre and is now one of the largest collections globally.

The Friends of the Theatre Collection, founded in 1976, have played a significant part in the growth of the collection, thanks to their financial contributions and publicity efforts.

Following refurbishment in 1998 to improve accessibility, study and storage conditions, the Theatre Collection was awarded full Registered Museum status by the Museums and Galleries Commission in 2001 and full Accredited Museum status by the Museums, Libraries and Archives Council in 2009. More recent developments have included the construction in 2011 of an off-site store at Langford to house its vastly expanded collections and renewal of its accredited museum status by Arts Council England in 2012.

The Bristol Theatre Collection, which has a particular focus on British theatre history, is largely made up of donations and bequests from enthusiasts and professionals who share the desire to preserve a record of theatre in Britain.

In 2011, the transfer of the world-renowned Raymond Mander and Joe Mitchenson Collection to Bristol's Theatre Collection was transformative. It has created a scholarly resource that is now used for research and teaching across the academic disciplines as well as a source of creative inspiration, learning and enjoyment for the wider public.

// Studio portrait of four boys in a 'boat', Shanghai, c.1930-40s

Premiere for 'lost' Elgar songs

A final year music student at the University performed two previously 'lost' songs by English composer Sir Edward Elgar. The songs – *The Millwheel* and *The Muleteer's Serenade* – were discovered by the team behind the *Elgar Complete Edition*, led by John Pickard, Bristol's Professor of Composition and Applied Musicology, as they worked at the British Library.

"Elgar's works are generally well documented, so the discovery of new pieces is an exceptionally rare event," said Professor Pickard. "The discovery was made by John Norris, General Manager of the *Edition*, during the preparation of our latest volume of Elgar's complete works."

The manuscripts were previously thought to have been either lost or preserved only as fragmentary sketches, which Elgar later incorporated into his 1896 cantata *King Olaf*.

They were heard in public for the first time at the Elgar Birthplace Museum near Worcester on Sunday 2 June when they were sung by Bethan Waters, a final year student in Bristol's Department of Music.

Photographic exhibition sheds light on China

A tennis party at Hoihow in 1898. A family picnic during wartime. These are just two of the thousands of images of Chinese life that form part of the Historical Photographs of China project at the University and help to shed light on a country undergoing rapid change at the end of the 19th and beginning of the 20th centuries.

Scholars from the University worked with peers at the University of Lincoln, the Institut d'Asie Orientale and TGE-Adonis to locate photographs of modern China, most of which were held by private collectors overseas. These images are of great historic interest since there is a lack of accessible photographic records in China itself following the destruction of materials during war and revolution.

An exhibition, called *Picturing China 1870-1950: Photographs from British Collections*, took place at the JW Marriott in Beijing. It was organised by the British Embassy, sponsored by the JW Marriott Hotel Beijing and opened by British Ambassador to China, Sebastian Wood CMG.

The Historical Photographs of China project is funded by the Arts and Humanities Research Council through the British Inter-university China Centre, and the British Academy.

// Our research

Social Sciences

// Graffiti in Stokes Croft, Bristol // Christine Barter, Senior Research Fellow in the School for Policy Studies

The anti-social network

A new study led by researchers at the University sets out to examine bullying, harassment and abuse on social networking sites

As parents, teachers and carers can attest, social media is now an integral part of many young people's lives with instant messaging and networking sites like Facebook and Twitter some of the most popular ways they choose to communicate. But while these sites can be socially enriching and rewarding, they can also be used by teenagers to bully, harass and abuse their peers and, in some cases, their partners.

Christine Barter from the University's School for Policy Studies began a study in January to examine the role of online technology in instigating and maintaining control and violence in the intimate relationships of teenagers – specifically, those aged from 14 to 17.

The project, entitled Safeguarding Teenage Intimate Relationships (STIR): Connecting online and offline contexts and risks, will assess the risks associated with online technology and abuse in teenage relationships across five European countries – England, Bulgaria, Cyprus, Italy and Norway. The aim is to examine the role technology plays in supporting physical, sexual and emotional forms of violence within teenage partnerships.

"We hope to raise awareness of this under-researched form of intimate violence by enabling young people's experiences and views to inform policy and practice, enhancing the development of appropriate intervention programmes across Europe," said Barter.

Over the course of two years, the team will map the occurrence, impact and dynamics of online and offline experiences of partner violence and control in order to gain a better understanding of the nature of, and factors associated with, this kind of abuse. In addition, the research team will explore young people's own experience of relationship violence and collect their views on prevention.

Results from the study will be used to help raise awareness of the issue and develop appropriate prevention and intervention programmes, including a directly accessible web-based resource and app for young people.

The study, which will be completed in January 2015, received €675,000 worth of funding from the European Union and will be led by Barter alongside Marsha Wood and Nadia Aghtaie.

Connecting communities

Community engagement needs a radical redesign. This is the assessment of academics from the Universities of Bristol and Cardiff who have begun a £2.4 million research programme that aims to connect communities from across Bristol and South Wales with businesses and policymakers.

Too often, they say, policymakers invite communities to comment on decisions after they've been made, which leaves isolated communities feeling even more disempowered. The project aims to reshape the way decision-making is made by inviting neighbourhood groups to work with academics on designing a research programme that is focused on the needs of the community rather than the interests of powerful institutions.

The programme will seek to understand how neighbourhoods can better engage with regulators, policymakers and businesses, as well as to identify new forms of consultation.

"A radical redesign of community engagement is needed to help neighbourhoods find new and more effective ways to be involved in the political and social issues that affect them," said Dr Morag McDermont, who is leading the research from the University of Bristol Law School.

The team will experiment with websites and social media to give communities online access to expertise and help them develop skills that will enable them to engage in policymaking. The research will also identify how new understandings and ways of working emerge when communities resist authority, exploring if and how this can create new forms of engagement.

The five-year study, called Productive Margins: Regulation for Engagement, has been funded by the Economic and Social Research Council.

Doing and debating

It was a day of discussion, debate and edification as the University of Bristol invited some of the country's leading minds to share their latest research at the Centenary Festival. Hosted by the Graduate School of Education, this free public festival was held to mark and celebrate the University of Bristol's 100th year of teacher education.

Sessions covered a range of topics and were open to anyone with an interest in education. During the day, a specially commissioned film showing the history of education at Bristol was premiered and featured previously unseen material from the University's archives.

Highlights included a talk by Professor Harvey Goldstein and Dr George Leckie on league tables, and a panel debate on the role of politics, research and guesswork in shaping the future of education.

Support for parents with learning difficulties

Parents with learning difficulties and their children will be able to access better support following the launch of a new project by the University's Norah Fry Research Centre.

The Working Together With Parents Network (WTWPN) is a free resource for professionals working with parents with learning difficulties and helps them stay up-to-date on policy changes, advice, research and positive practice. This nationwide network aims to help parents and their children gain access to the support necessary to ensure they stay together in the family setting.

The Norah Fry Research Centre was awarded £200,000 from the Esmée Fairbairn Foundation to fund further work on the WTWPN.

View of Vietnamese reform may be inaccurate

Research at Bristol suggests that the prevailing view of the economic reform that has taken place in Vietnam over the past 25 years may be distorted.

Since 1986, the country has been working to create a socialist-orientated market with the ruling Communist Party working with the international donor aid community to instil major changes within its governance systems.

The dominant view is that this reform has been led by Vietnam's political elite, who have made a series of important policy changes that have set the country on a new path. However, Martin Gainsborough, Professor of Development Politics in the School of Sociology, Politics and International Studies, suggests that this orthodox view places too much emphasis on change, policy and the elite initiative, which results in only a partial account of reform.

Gainsborough has researched Vietnam for over 20 years, having lived and worked there, and his new findings have helped influence thinking within the donor community and provided rationale for consequent changes in the design of government initiatives.

// University students attended the teacher education Centenary Festival

// Our research

Engineering & Science

// Researcher at the School of Experimental Psychology

Cracking the semantic code

Researchers at the University's School of Experimental Psychology analysed millions of blogs to discover the hidden meaning behind our words

Should you read this feature or turn the page? Will you eat a salad or a sandwich for lunch? We make choices about pretty much everything all the time, but have you ever asked yourself why you make those decisions?

According to Dr John Fennell and Dr Roland Baddeley of the University's School of Experimental Psychology, it's down to the meaning we attach to words or concepts. Each time we make a decision, we use what's called the common quantity or reward to help us make that choice: a representation of what could be gained combined with how risky and uncertain it is.

The researchers looked at the work of psychologist Charles Osgood who, over 50 years ago, developed a method known as the 'semantic differential'. This attempted to measure the connotative meaning of a word or concept. Osgood found that around half of the variation in the ratings people made about words could be captured using just three summary dimensions: 'evaluation' – how nice or good the object is, 'potency' – how strong or powerful it is, and 'activity' – whether the object is active, unpredictable or chaotic. So half a word's meaning is simply a measure of how nice, strong and active it is. But no one knew why.

To test this, researchers needed to estimate the number of good or bad things happening. But estimating this across a wide range of contexts and concepts seemed impossible – someone would need to be observed throughout his or her entire lifetime to record the number of times good or bad things happened.

However, researchers found a more practical solution in the form of online blogs. After analysing millions of blog entries, which describe aspects of people's lives and are also searchable, the researchers found that the 'evaluation' dimension was a very good predictor of whether a particular word was found in blogs describing good situations or bad.

In addition, researchers discovered that 'potency' was a very good predictor of the probability of bad situations being associated with a given object: it measured one kind of risk. 'Activity' – that is, unpredictability or uncontrollability – was also found to be a highly relevant measure of risk: for example, a knife in the hands of a trained chef is probably safe; a knife in the hands of an erratic stranger is not.

The researchers concluded that half of a word's meaning is a summary of how rewarding it is and how much two kinds of risk are associated with it. Being sensitive to both rewards and risks is so important to our survival, they said, that its representation has become wrapped up in the very nature of the language we use to represent the world.

Quantum leap

Dr Steve Brierley and his fellow researchers at the School of Mathematics have found that a quantum computer doesn't need to be a single large device but, in fact, could be built from a network of small parts.

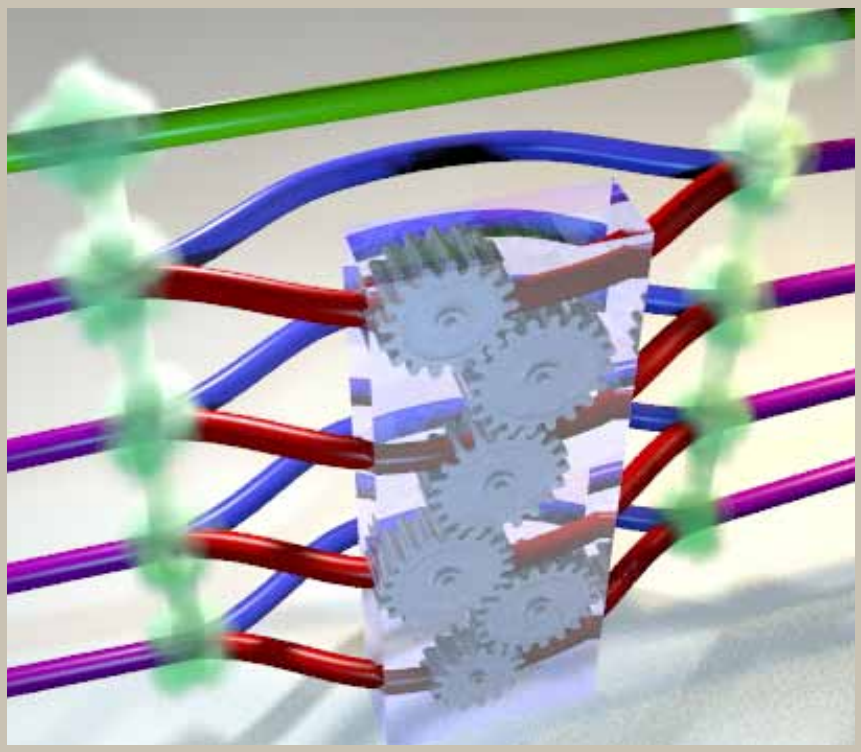
It was previously understood that a single large device would be needed if a quantum algorithm is to offer an exponential speed-up over classical computing. However, Dr Brierley found that a network of small quantum computers can implement any quantum algorithm with a small overhead.

"Building a computer whose operation is based on the laws of quantum mechanics is a daunting challenge," said Dr Brierley. "At least now we know that we can build one as a network of small modules."

Meanwhile, an international research group led by scientists from the University of Bristol and the University of Queensland, Australia, has demonstrated a quantum algorithm that performs a true calculation for the first time. Quantum algorithms could one day enable the design of pharmaceuticals and clean energy devices.

Previous demonstrations of quantum algorithms had been seen, but none of them implemented the quantum algorithm without knowing the answer in advance. "We built a full quantum circuit to implement the phase estimation algorithm without any simplification," said Dr Xiao-Qi Zhou, who led the project. "We don't need the answer in advance and it is the first time the answer is truly calculated by a quantum circuit with a quantum algorithm."

// The device for iterative quantum phase estimation



What readers want

It's news to the ears of online editors everywhere as a new study has found what makes people click. The study, led by Nello Cristianini, Professor of Artificial Intelligence at the University's Intelligent Systems Laboratory, analysed thousands of online news articles to create a model of 'news appeal' based on the words contained in a story's title and intro.

The models compared articles that became 'most popular' on any given day with those that did not, and identified the most attractive keywords, as well as the least attractive ones.

"We found significant inverse correlations between the appeal to users and the amount of attention devoted to public affairs," said Professor Cristianini. "People are put off by public affairs and attracted by entertainment, crime and other non-public-affairs topics."

Professor Cristianini is supported by the CompLACS FP7 project.

Cell catcher

Researchers from the University's Department of Mechanical Engineering have shown experimentally how cells or small objects can be captured using a 'sonic lasso'.

A spinning ultrasonic, or sonic, vortex acts as a lasso that can be controlled and moved, thereby catching microscopic particles and moving them. This new technology can be used to assemble human tissue from a collection of cells and bringing together nano materials.

"Our research has shown that we can grip and move particles pretty much anywhere and along any path," said Bruce Drinkwater, Professor of Ultrasonics in the Department of Mechanical Engineering. "The impressive thing is that it is completely non-contact, harmless and so ideal for moving delicate things, such as cells, around under a microscope."

// Engineering & Science

// A shape-shifting mobile device called a Morphee // The School of Biological Sciences has found that flowers use electrical signals to communicate with bees

Meet the Morphees

Whether you want to order a cab, check the weather or listen to the radio, you'll find an app to meet your needs. But imagine the possibilities available to developers if mobile devices could change shape on demand.

The concept is not as outlandish as it seems following the unveiling of prototype shape-shifting mobile devices by Dr Anne Roudaut and Professor Sriram Subramanian from the University's Department of Computer Science.

Morphees are self-actuated flexible mobile devices that can change shape on demand to better fit the services they need to support.

For example, users could download a game application and the mobile would morph into a console-like shape. It could also transform into a sphere and serve as a stress ball or bend itself to hide the screen when users type in a password.

Nature's electric signs

Bright colours, patterns and enticing fragrances: just some of the ways flowers attract pollinators. But, according to researchers from the University's School of Biological Sciences, led by Professor Daniel Robert, there's more to petunias than meets the eye.

During their study, researchers found that flowers use electrical fields to communicate with pollinators, like bees. Plants are charged negatively while bees have a positive charge. As a bee approaches, a small electric force builds up that could convey information.

Researchers placed electrodes in the stems of petunias and found that when a bee lands, the flower's potential changes and remains so for several minutes – perhaps telling bees that another bee has recently visited.

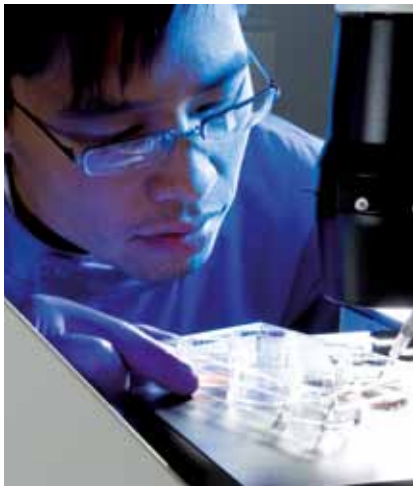
"The last thing a flower wants is to attract a bee and then fail to provide nectar," said Professor Robert. "A lesson in honest advertising since bees are good learners and would soon lose interest in such an unrewarding flower."

The research was supported by the Leverhulme Trust.

// Our research

Medical & Clinical Sciences

// Students and researchers at the Faculty of Medicine and Dentistry



The battle against kidney disease

The results of a clinical trial carried out by Bristol University researchers will help shape the treatment of kidney disease across the world

A pioneering nationwide clinical trial that compared different types of treatment for a common type of kidney disease has found one to be significantly more effective.

The study, led by researchers from the University of Bristol's Academic Renal Unit based at Southmead Hospital, and funded by the Medical Research Council, compared three different treatment approaches in patients with membranous nephropathy, a type of kidney disorder.

This condition leads to changes and inflammation of the structures inside the kidney that help filter waste and fluids. It is usually managed with immunosuppressive drugs but despite this the condition still carries a high risk of causing kidney failure in patients.

Previous studies of the disorder, which is costly to treat, show that once kidney function starts to decline, continued deterioration can be expected.

Professor Peter Mathieson, Dean of the Faculty of Medicine and Dentistry, and his research team carried out a randomised controlled trial involving 108 patients with 20 per cent decline in renal function at 37 renal units across the UK. The patients were randomly given one of three treatment approaches and followed up by the team over three years.

One particular approach – specifically, six months' therapy alternating monthly cycles of prednisolone and chlorambucil – was shown to be the most effective in preventing further renal decline with the benefits maintained over the three-year study period. The treatment will now be recommended to clinicians worldwide as the most effective approach to treating the condition.

Professor Mathieson said: "Kidney failure is a devastating condition that is difficult and expensive to treat and our best strategies are to aim to prevent it wherever possible by more effective treatment of the underlying kidney problems. This clinical trial took a very long time to complete and I was helped by kidney specialists, research nurses and patients in Bristol and all over the UK. The results improve the evidence base for our treatments in this form of kidney disease."

The study, called Immunosuppression for progressive membranous nephropathy: a UK randomized controlled trial, was funded by the Medical Research Council, Novartis, the Renal Association and Kidney Research UK. The results were published online in world-leading medical journal *The Lancet*. Professor Mathieson would like to thank Tracey Chapman (trial administrator) and Maria Langdon (research nurse) for their hard work as well as all the participating patients and clinicians around the country, and the principal funding bodies, MRC, Kidney Research UK and the Renal Association.

// Medical & Clinical Sciences

On a journey through the brain

New research led by Dr John Crabtree in the School of Physiology and Pharmacology could help psychiatrists gain a deeper understanding of the debilitating symptoms experienced by schizophrenics trying to cope with their environment.

"Wherever you look in the brain, there are broadly speaking two functional parts," he said. "There is an information-bearing part, which provides 'content', and a complementary part that provides 'context' – because in order for a piece of information (content) to be meaningful, there needs to be a temporal background (context) in which it occurs."

In simple terms, schizophrenia can be seen as a temporal breakdown among the content-bearing parts of the brain. If the context-providing parts fail to coordinate with the timings of the content-providing parts, information will lose its meaning and behavioural anticipation of environmental changes will be lost.

The primary area of focus for Dr Crabtree is on the thalamic reticular nucleus (TRN) – the nuclei that provide context for information transmitted through the thalamic content-bearing nuclei, giving that information meaning.

"A content-context model of schizophrenia, with its emphasis on the failure of context-providing parts of the brain to temporally coordinate the information transmitted by content-bearing parts of the brain, offers a viable framework within which to reassess our understanding of schizophrenia and direct future research," concluded Dr Crabtree.

Controlling parasites

They may be man's best friend but the estimated 10 million dogs in the UK come with a potentially damaging addition. New research, led by Dr Eric Morgan from the University of Bristol's School of Veterinary Sciences, has shown that dogs are a major source of toxocara.

This parasitic worm is a rare cause of disease in humans, responsible for abdominal pain, loss of sight and potentially asthma and epilepsy. The aim of the study was to identify where efforts to control the parasite should focus.

The link with dogs has long been accepted, but this study has shown that the parasite remains common, despite decades of efforts to control it through worming and the removal of dog faeces.

"This will hopefully help locally appropriate control measures to be put in place," said Dr Morgan. "The date also provides a baseline against which future changes can be measured, as we currently lack any good evidence of how effective steps such as anti-fouling legislation are in reducing egg load and human disease."

// Researchers used a 3D computer model to help solve the mystery of how a heart regulates its beat

The beat goes on

A three-dimensional computer model built by University researchers has helped solve a 20-year mystery of how a heart regulates its beat.

When your heart beats – or contracts – the contractile machinery is switched on by an increase in calcium within the cell. This increase is triggered by a release from intracellular stores activated by a small influx of calcium into the cell during the cardiac electrical signal.

Back in the early 1990s, Professor Mark Cannell from the School of Physiology and Pharmacology discovered that this release took the form of microscopic events called 'calcium sparks'. However, they could not explain how the calcium spark itself terminated. Now a team of researchers led by Professor Cannell alongside Dr Laver from the Hunter Medical Research Institute in Australia has found a solution.

The team constructed a three-dimensional computer model of the release machinery, which showed that the automatic release could be stopped without having to invoke any other mechanism – a process the team called 'induction decay'.

They concluded that there's good evidence that the calcium release mechanism becomes faulty during heart failure, paving the way to improving our understanding of what goes wrong when somebody's heart fails.

Reducing the risk of disease

Scientists from across the University of Bristol have been exploiting the latest advances in genetics at a new £23 million research unit. The Integrative Epidemiology Unit (IEU) will help experts from a range of disciplines gain a better understanding of how changes to lifestyle or environment, as well as pharmacological interventions, can reduce the risk of disease.

The IEU, which is directed by Professor George Davey Smith, was launched on 1 June 2013 and has been jointly funded by the Medical Research Council (MRC) and the University of Bristol. It capitalises on major University investments in new technologies that allow the processing of large numbers of samples in unprecedented detail, helping scientists gain a deeper understanding of the biological mechanisms underlying disease.

Reducing blood pressure

Scientists from the University have worked with cardiologists at the Bristol Heart Institute (BHI) to create a pioneering technique that can help reduce high blood pressure and lower the risk of stroke, heart and renal disease in patients.

The new technique, called renal denervation, involves removing the nerves connecting the kidney to the brain and has been successfully trialled on 19 patients at the BHI. The technique is very straightforward and, importantly, there are no side effects.

The University and BHI collaborated to form the CardioNomics high blood pressure team and together they hope to tackle this major health problem. The CardioNomics team has received a £100,000 grant from Medtronic to further improve the technique and expand patient trials.

// Hens were given omega-3 supplements during research carried out by the School of Veterinary Sciences

Healthy hens

It's one of the most popular health supplements on the market and is linked to a wealth of potential health benefits, from reducing the risk of heart attacks to lowering blood pressure. Now researchers have found that omega-3 could also help avoid bone damage in laying hens.

Dr John Tarlton and colleagues from the University of Bristol's School of Veterinary Sciences led a three-year research project investigating the benefits of omega-3 supplemented diets in laying hens. Free-range hens were given a diet supplemented with omega-3 alpha linolenic acid, and the skeletal benefits were compared to hens with standard diets rich in omega-6 linoleic acid.

They found a 40 to 60 per cent reduction in keel bone breakage and a corresponding reduction in breakage severity in the omega-3 supplemented hens. They also found significantly greater bone mineral density and improvements in bone structure.

The findings of the research, which was published in the journal *BONE*, could also help human patients suffering from osteoporosis.

// Medical & Clinical Sciences

// Getting a clearer understanding of chronic fatigue syndrome at CRIC Bristol // The School of Physiology and Pharmacology is studying chronic pain

Understanding chronic fatigue syndrome

Chronic fatigue syndrome (CFS) is a debilitating condition that affects around 250,000 people in the UK. It's a condition that leaves patients feeling utterly exhausted but the reason why remains unclear.

Research carried out by Jade Thai, Senior Research Fellow and manager of the University's Clinical Research and Imaging Centre (CRIC Bristol), aims to get a clearer understanding of the cognitive impairment often associated with CFS.

A group of 15 people with CFS were asked to undertake a variety of simple tasks while an MRI scanner scanned their brains. The findings were then compared to brain scans of a further 15 people without CRS who undertook the same tasks.

"We found that although the patient group performed the task as well as the control group, their brain patterns were very different," Thai explained. "The CFS group used significantly more of the brain than the control group, which indicates some sort of compensatory mechanism at play."

CRIC Bristol's findings were presented at an event hosted by The Wellcome Trust in London, in which CFS and ME researchers shared their work and identified future research priorities.

Identifying the cause of chronic pain

Whether you've broken a bone or given birth, it's safe to say we've all experienced pain and while describing the symptoms can be relatively easy, identifying the cause is far more difficult, particularly if the pain becomes chronic.

Dr Lucy Donaldson from the University's School of Physiology and Pharmacology believes the answer lies in untangling the neuronal networks that tie the physiological system together.

Working with colleagues at the University, Dr Donaldson will look at the cellular, anatomical, electrophysiological, behavioural and clinical implications of chronic pain.

In seeking the cause, the researchers hope to bring greater scientific understanding to the field while also helping to identify potential molecular targets that could aid the development of better drugs to treat pain.

// Our research

Addressing key global challenges

The University currently has two University Research Institutes whose remit is to address some of the world's most challenging issues by bringing together leading academics from a wide variety of fields from across the University and beyond. Both foster interdisciplinary research on an ambitious scale in recognition of the fact that humankind increasingly needs creative and innovative solutions in order to address its most pressing problems.

The Cabot Institute

Named after the Genoese explorer John Cabot (Zuan Caboto), who is credited as discovering 'New Foundland' (i.e. Canada) after setting sail from Bristol, the Cabot Institute carries out research on risks and uncertainty in a changing environment. The Institute has a particular interest in climate change, natural hazards, food and energy security, resilience and governance, and human impacts on the environment.

Recent research carried out by Dr Mark Woodhouse, a mathematician at the Cabot Institute, examined in detail the eruption of Iceland's Eyjafjallajökull to ensure that the UK is better prepared for volcanic crises in the future.

Using a model developed at the Institute, researchers found that the amount of ash released by the volcano was significantly underestimated at the time. Given that airspace management during eruptions relies on the accurate forecasting of spreading ash, this finding could have important consequences for commercial air travel in the future.

Dr Woodhouse said: "This study represents an important development in our modelling of volcanic plumes and allows more accurate assessments of the source conditions to be made during volcanic eruptions. The results of our study can complement the state-of-the-art forecasting tools used to predict the spreading of ash during volcanic crises."

This work is already having a significant and positive impact in strategic decision-making at the time of volcanic activity.

The Elizabeth Blackwell Institute for Health Research

The University's Elizabeth Blackwell Institute sets out to provide innovative solutions to the most pressing health problems of the 21st century. It will achieve this by encouraging new ways of working as well as fostering collaborative approaches between scientists, the industry, clinical practitioners and patients.

Professor Jeremy Tavare, Director of the Elizabeth Blackwell Institute and Professor of Biochemistry at the University, said: "Our focus is to identify highly innovative new areas of research and allocate the expertise and funding to help translate new breakthroughs into benefits for patients. We will be supporting a full spectrum of research activity that can impact on better healthcare, including engineering, chemistry and mathematics, right the way through to social, community and clinical sciences."

For example, a pioneering collaboration led by the University of Bristol hopes to address the challenges faced by the UK's healthcare system by developing a digital health assistant that can be fitted into people's homes. The collaboration, known as SPHERE (Sensor Platform for HEalthcare in a Residential Environment), was awarded £12 million by the Engineering and Physical Sciences Research Council and brings together researchers from the Universities of Bristol, Southampton and Reading. They will work in partnership with Bristol City Council, IBM, Toshiba and Knowle West Media Centre.

"SPHERE will address real world challenges by developing a practical technology to monitor people's health in the home environment," said Professor Ian Craddock, Director of the interdisciplinary research collaboration.

// The brain's role in obesity

Why are some of us more likely than others to overeat? Does our genetic make-up affect our chances of being overweight? These are some of the questions being asked by Dr Elanor Hinton, Fellow of the Elizabeth Blackwell Institute for Health Research (EBI), in a new study that will measure the neural, hormonal and behavioural responses to food consumption.

Using state-of-the-art neuroimaging techniques, Dr Hinton aims to identify which regions of the brain are involved when people are motivated to eat excessively and, in doing so, hopes to see what difference scientific research can make to changing eating behaviour.

// The study is funded by the Bristol Nutrition Biomedical Research Unit







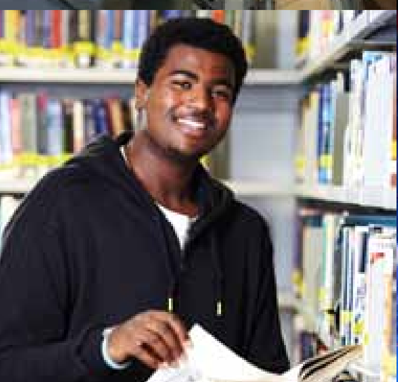
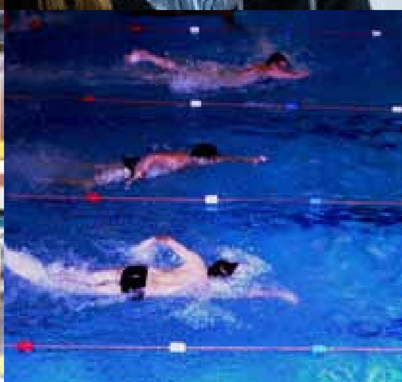














A global institution

Many of the University's activities and partnerships support its role as a global institution. It seeks to address key global challenges through its research, it builds partnerships with other leading international universities, it attracts the brightest minds from across the globe and its alumni are present in more than 180 countries. Meanwhile, the University's home students are encouraged to take advantage of the many overseas study opportunities available to them.

The University has over 150 exchange links with top ranking universities in more than 30 countries around the world. Depending on a student's degree programme, they are able to choose from these exchange links in order to study abroad for a semester or a full academic year as part of their course at Bristol. Possibilities include the Sorbonne in France, the University of Chicago in the United States and McGill in Canada.

Some students also have the option of taking part in a work placement abroad that forms an integrated part of their study. Bristol students have worked at companies such as Sotheby's in Madrid, *Vogue* in Paris and Credit Suisse in Milan. Students benefit from the opportunity to learn a new language, experience a new culture and enhance their desirability with prospective employers. >

// A global institution

Global collaborations

In 2013 academics from the University worked with colleagues from 11 universities in the UK and Japan in flagship collaborative projects.

RENKEI, the Research and Education Network for Knowledge Economy Initiatives, brought together scholars from the Universities of Bristol, Leeds, Liverpool, Newcastle, Southampton and UCL, and the Universities of Kyoto, Kyushu, Nagoya, Ritsumeikan and Tohoku in Japan to create pilot projects in which three main areas would be explored: technology and knowledge exchange with industry, student mobility and social engagement.

The first project to come out of the collaboration was the RENKEI Researcher Development School, which took place in Bristol in July and was supported by the British Council in Japan. The University hosted 22 early career researchers from 11 institutions (five from Japan and six from the UK) during a four-week summer school. Its aims were to:

// develop future research leaders with the skills to lead collaborations between different disciplines and cultures

// facilitate the formation of active collaborations between participants to achieve a tangible outcome

// develop a sustainable network of researchers across Japan and the UK

The researchers looked into the theme of Urban Sustainability and Resilience, took part in a variety of workshops, visited the National Composites Centre to look at collaboration with industry and attended a 'world café' where they generated ideas for projects around urban sustainability.

Bristol-Kyoto Symposium

The University further cemented its relations with Kyoto University through a pioneering international research collaboration, which welcomed a record-breaking 90 academic delegates from the Japanese institution in January 2013.

// Images from the Bristol-Kyoto Symposium, which took place in January 2013

In what was believed to be the biggest symposium of its kind ever held in the UK, a contingent from Kyoto University travelled to Bristol to discuss how the latest thinking and technologies could solve some of the planet's biggest challenges.

Kyoto University is one of the top research universities in the world and is highly regarded for its academic excellence, being placed 20th in the *Times Higher Education World Reputation Rankings*. Bristol-Kyoto's joint research projects focus on major issues like predicting and tackling natural disasters and improving medical treatment through the use of technology, and reflect the growing importance of international partnerships to tackle global research problems.

The partnership also helps to attract external investment opportunities for academic and student exchanges, alongside the opportunity for both universities to benefit from existing relationships with industry.

Building links with China

The University attracts hundreds of international students every year, including many from China. To celebrate the success of its alumni and further its relationship with China, the University invited students from across the country to take part in graduation celebrations in Beijing and Shanghai. The inaugural event took place at the China World Hotel in Beijing and the traditional British ceremony was attended by 650 alumni, their guests and representatives from the University of Bristol, including the Vice-Chancellor, Sir Eric Thomas.

The hotel was decorated with giant photographs of University landmarks, including the Wills Memorial Building and Victoria Rooms, as well as an image of the Clifton Suspension Bridge, rendered in QR code, all designed to allow students to share their memories of the University and city with family and friends. The event generated great interest among Chinese traditional and social media.

Transatlantic research

Key research institutions in Britain and America have joined forces to study and to combat some of the most

common eye diseases. The University in partnership with University Hospitals Bristol NHS Foundation Trust, the National Institute for Health Research (NIHR) Biomedical Research Centre (BRC) at Moorfields Eye Hospital and UCL's Institute of Ophthalmology, has entered into a Consortium agreement with the National Eye Institute of the American National Institutes of Health.

Professor Andrew Dick, Faculty Research Director in the Faculty of Medicine and Dentistry at the University of Bristol and Theme Lead for Inflammation and Immunotherapy at the NIHR Moorfields BRC, said: "This Consortium truly combines transatlantic research excellence to deliver cutting-edge advances in the fight against inflammatory eye diseases."

Dr Richard Lee, NIHR Clinical Lecturer in Ophthalmology at Bristol Eye Hospital and the University of Bristol and at the NIHR Moorfields BRC, added: "This is an unprecedented opportunity to bring British and American patients together."

"This is an unprecedented opportunity to bring British and American patients together"

Worldwide Universities Network

As a member of the Worldwide Universities Network (WUN) since 2001, the University of Bristol has been able to forge close partnerships with leading institutions around the globe.

Staff and students are encouraged to participate in WUN's broad range of activities, tackling some of the major research challenges that no individual institution could address alone.

The advantages of international engagement

The EPSRC grant, Building Global Engagements in Research, demonstrated the advantages of international engagement for the University's young researchers and students.

Some of the work supported through the grant includes Dr Mark Lowenberg's study of airliner upset and loss of control, which has helped to increase Bristol's international profile. Dr Lowenberg and his student Stephen Gill used their grant to visit the NASA Aircraft Loss-of-Control Research Working Group and the NASA Langley Research Centre. They also invited NASA researcher Dr Luis Crespo to visit the University, resulting in a joint conference paper and published article in the *Journal of Aircraft.*

Students were given the opportunity to work with international experts when Dr Wuge Briscoe from the School of Chemistry visited the Royal Institute of Technology in Stockholm with five PhD students. Dr Briscoe also visited Grenoble to initiate collaborative projects with scientists and hosted visits from Sweden and Australia to discuss potential grant proposals, data analysis and paper writing. The grant also provided opportunities for students and academics to carry out research and training in the multidisciplinary context of global challenges.

Dr Alberto Peruzzo from the Centre for Quantum Photonics worked with expert Dr Mohan Sarovar at Sandia National Labs in the USA to tackle two areas of UK national priority: renewable energies and quantum information science and technology. Dr Sarovar also visited Bristol giving graduate students the chance to be involved and trained in this new and multidisciplinary field.

Students overseas

Two University of Bristol students took part in a pioneering project that aims to bring sustainable electricity to a deprived area in Mumbai and to two remote Indian villages.

Chloe Tingle, who recently completed a Masters in Engineering Design, and Adam Smith, who has a Masters in Physics, travelled to Tamil Nadu to discuss how villagers could generate their own power. During the trip, the pair held workshops to educate local people about the importance of renewable energies and met with local suppliers of biomass and biogas generators.

The fact-finding mission was part of a project led by Bristol-based charity The Converging World, which has installed wind farms in the villages of Kalilaspura and Muthumakamura and invests its profits into helping people who live in energy poverty.

Working in partnership

The University's partnerships extend way beyond academia and embrace all sectors as well as many parts of the community. It is at the forefront in engaging the public in its research and jointly hosts the National Coordinating Centre for Public Engagement along with the University of the West of England. Part of the University's ethos is that it should play an active role within the city of Bristol and the surrounding region. These activities encompass everything from the regional health agenda, supporting the region's economy, through to supporting and contributing to the city's globally renowned cultural, creative and scientific output.

Industry

A leading example of university-industry collaboration is the National Composites Centre (NCC) – a world-leading research and technology hub that is owned by the University and draws on established links to world-class composites research at Bristol, the University of Bath and other UK universities.

Following government funding of £28 million, the NCC, based on Bristol and Bath Science Park, is set to double in size, allowing it to extend its capabilities to develop composite technology for the aerospace, automotive, renewable energy and rail sectors. In addition, it will provide a new world-class training centre for higher level and vocational skills development, helping to train the next generation of engineers and bringing together leading businesses, colleges and universities.

A delegation from Kyoto University, led by Professor Kiyoshi Yoshikawa, recently visited the NCC to see how it's putting the region at the forefront of innovation in high-tech materials and strengthening the link between the University and industry. Their visit was part of an ongoing relationship aimed at exploring collaborative research opportunities and allowed Bristol to showcase its expertise in environmental change, nuclear research and more.

Universities

Collaborations between universities both globally and locally are increasingly important, helping to address global challenges and maximise the impact of and return on investment from research funding.

This year, the Universities of Bristol, Bath, Cardiff and Exeter announced a formal collaboration, known as GW4, which brings together a high concentration of research expertise and capability.

"Regional groupings of research intensive universities are a rapidly emerging and important evolution," said Sir Eric Thomas. "These will be increasingly important in order for universities to address grand intellectual and societal challenges."

The GW4 Board is chaired by Professor Guy Orpen, the University of Bristol's Pro Vice-Chancellor for Research.

The public

The University has also undertaken a variety of projects to help maintain and strengthen its relationship with the public and the city of Bristol as a whole. In Seeds of Change: Growing a Living History of Bristol, the University worked with 16 schools and community groups to help them learn about the city's trade and maritime past through the power of plants.

In another pioneering project, the University will join forces with over 20 local schools to help get young people involved with university research. The aim of the project, which is funded by Research Councils UK (RCUK), is to introduce schoolchildren to the world of research and encourage them to raise their aspirations for further study.

The University also built on its relationship with the Bristol Festival of Ideas by announcing a formal partnership with the organisation.

The festival – an annual programme of 200 talks, debates, conferences, exhibitions and more – is a key event in Bristol's cultural calendar and is widely regarded as one of the leading festivals of its kind in the UK.

// Dr Dave Glowacki // The Seeds of Change project // *Hello Lamp Post!* won Bristol's first Playable City Award

"Regional groupings of research intensive universities are a rapidly emerging and important evolution, that will be increasingly important in order for universities to address grand intellectual and societal challenges"

Bristol supported the festival in increasing the number and range of events and in commissioning new events with international thinkers and writers, as well as opening up festival events to its academics and students.

In another project, Bristol worked with Watershed on the city's first-ever Playable City Award, where artists from across the world were asked to change the way people interact with the city by using inanimate objects to trigger playful interactions.

The winning entry, *Hello Lamp Post!*, invited visitors and residents to interact with lamp posts, bus stops and postboxes by texting a code found on these familiar objects. "*Hello Lamp Post!* is hugely exciting and the University is pleased to support this fantastic initiative which supports Bristol's rightful place on the global cultural map," said David Alder, Director of Marketing and Communications. The University acted as a partner and ambassador for the project.

Research at the University has also inspired a groundbreaking science-meets-art experiment. *danceroom Spectroscopy* (*dS*) was spawned from the work of Dr David Glowacki, a University researcher and Pervasive Media Studio resident.

By combining 3D cameras and bespoke software, *dS* uses physics to create sounds and images from people's movements, which are captured and fed into a program developed by Dr Glowacki's team and interpreted as energy fields.

dS has so far been exhibited at Arnolfini, the Barbican Arts Centre and featured as part of the Cultural Olympiad. Dr Glowacki was named as joint winner in the individual category at the University's 2012/13 Engagement Awards.

Education and the student experience

We aim to educate individuals with the highest potential to excel in their chosen careers. Central to our ethos at Bristol is research-led teaching. This means that our students are involved in and exposed to the very latest thinking in their academic discipline, as well as benefiting from core skills driven through research projects, that include tackling challenging problems, managing their own projects and taking responsibility for decisions – all of which are exceptionally important skills required throughout all of their careers. We continue to invest comprehensively in facilities, training and technology, as well as seeking to remove barriers for those people who may not traditionally consider a university like Bristol as being an attainable goal.

The University's priorities in this area are to:

// attract and retain academically gifted and highly motivated students from a wide range of backgrounds, creating a diverse and international University community

// provide an education of the highest quality that is research-led and focused on the needs and expectations of our students

// ensure students have a fulfilling, challenging and intellectually stimulating experience while at University, that prepares them for employment and worldwide opportunities when they leave

// provide effective and enabling educational leadership and structures that support educational enhancement

// ensure that learning takes place within a high-quality environment that enables both students and staff to achieve their full academic potential

Supporting and rewarding excellence in teaching

At Bristol we set the bar high and we encourage excellence in our teaching and the overall student experience in many ways. This ensures we provide high-quality teaching for our students that nurtures and equips them to become highly professional graduates and potential leaders.

Our 2013 National Student Survey results showed that 87% of our students expressed 'overall satisfaction'





and 91% indicated that they found their course intellectually stimulating.

We take steps to promote student engagement and satisfaction, with strong leadership in subject disciplines to provide a strong sense of academic community. Our framework for student support and tutoring encourages independent and active learning, while our work with the University Students' Union (UBU) aims to champion greater student engagement and student representation within the academic life of the University. Similarly, we uphold rigorous processes to maintain our high standards of teaching, including periodic peer review and encouragement, to continually push forward pedagogic boundaries.

We are committed to continually raising awareness of the value we place on excellence in teaching. The Bristol Teaching Awards is a recent illustration of this commitment. Launched in 2013, its aim is to recognise and reward those who have made an outstanding contribution to teaching and the provision of support for students.

The inaugural ceremony was held in June 2013 and 14 awards were presented in four categories: Dean's Award for Education, Registrar's Award for Teaching, Students' Award for Teaching and Students' Award for Support. In addition, there was a Vice-Chancellor's Award for Teaching/Education, presented to an individual or team who made an exceptional contribution to education and the enhancement of the student experience. Students and members of staff were invited to vote and these nominations were considered by a panel who chose the winner. Importantly, the Bristol Teaching Awards is a joint venture between the UBU and the University.

"Students can take advantage of a range of opportunities to help develop their skills and gain useful experience"

Skills development

Wider skills development plays an important part in ensuring our students reach their full potential both while at University and then on into their chosen careers.

Students can take advantage of a range of opportunities to help develop their skills and gain useful experience. More than 2,000 paid roles are available to students across the University, including Campus Internships, which provide demanding, project-based work, and via the University Internship Scheme, in which we fund our students to work with small and medium-sized enterprises.

An example of this is the Faculty of Engineering-specific First Year Internship and Mentoring Scheme, which has recognised the need for students to gain crucial experience as early as possible. The Faculty has worked closely with its industrial partners to create hundreds of opportunities for students to be mentored by somebody in industry and to gain work experience. In addition, the International Internship Scheme allowed students to gain experience abroad during summer 2012.

Bristol attracts hundreds of employers and alumni to its campus each year, and their involvement enhances the Bristol experience through their input into teaching and learning, and their involvement in our comprehensive careers programmes. Over 100 employer-led sessions took place during 2012-13, giving students specific sector knowledge and the chance to experience the reality of different careers.

Many employers put our students through their paces in mock interviews in order to give them valuable feedback and to hone their skills. In addition they provided courses on leadership,

>

// Education and the student experience

// Students are given a range of opportunities during their time at Bristol


negotiation and commercial awareness to give a realistic taste of what our students will experience when they embark upon their careers.

Employers and alumni are also heavily involved in our professional skills development units, where major corporates deliver sessions on creativity and innovation and provide advice on how to make the most of their time at university. Lastly, we encourage and support skills development through extra-curricular activity and our Bristol PLuS Awards scheme, which recognises significant achievement outside of the lecture theatre, is taken up by an increasingly large number of our students.

Continual innovation through the curriculum also plays an important role. For example, we will soon launch a new Liberal Arts programme which will provide our graduates with a diverse and broad range of skills through studying a wide range of disciplines, as well as a third year spent studying abroad. As with all our programmes, this will most definitely set challenging and high demands of our students.

Student enterprise

Encouraging and supporting student enterprise forms an important part of the overall student experience, whether this is helping students build freelance businesses or supporting high-tech spin-out companies.

Enterprise education opportunities are available to all students through Basecamp (businessbasecamp.co.uk), which supported over 200 students to explore business ideas last year and won 'Best Student Enterprise Experience' at the annual SETsquared Student Enterprise Awards. We also have award-winning Student Enterprise Societies, picking up both NACUE's 'Best Venture Support' and we were runner-up in Enactus UK's 'Best New Team' category.

Increasingly we teach in the curriculum, with examples including teaching technology business start-up to over 300 engineering students a year, working with Vet Science students on practice management, to emerging units on commercialising life science discoveries and creating sustainable cultural enterprise around historic sites which fund their conservation.

Widening participation

The University has an ongoing commitment to widening participation in higher education, achieved through a variety of programmes and initiatives.

// IntoUniversity

The University launched a joint initiative with IntoUniversity in April 2013 within an area that has one of the highest proportions of children living in poverty in Bristol.

The initiative is focused around a centre which, in its first year, will work with 450 local young people with an aim to increase this to 900 per year from 2014. Three strands of activity are provided: primary and secondary academic support; programmes that provide a variety of workshops focused on the national curriculum; and mentoring.

// Emerging entrepreneurs

Matt Montgomery, a mature EngD student in the Systems Centre, came through our Spark enterprise boot camp (www.sparkcourse.co.uk) with an idea for a social enterprise that grew high-quality salads and vegetables on derelict land in the city using novel farming techniques. This idea has subsequently evolved into recycling coffee grounds into fertiliser, growing products for local restaurants and cafés using brownfield sites, and also employing young people in danger of leaving education and providing them with work that supports them to continue their studies. Matt's business proposal, Growing People, won £8,000 in funding from the New Enterprise Competition alongside a £2,500 'Try it' social enterprise grant also provided by the University.

The New Enterprise Competition overall winner was Computer Science PhD student Tom Carter whose 'Ultrahaptics' idea for touchless feedback from electronic devices has emerged from his research. Tom had taken enterprise education units here at Bristol as an undergraduate and his business not only won over £15,000 in funding but also attracted serious industry attention.

Key to the success of the centre and its strands is the involvement of the University's students who provide academic mentoring and support throughout. IntoUniversity began operating in 2002 in London and now has 15 centres nationally.

// Foundation year

Launched in September 2013, the Faculty of Arts' Foundation Year in Arts and Humanities is designed for individuals who don't consider themselves to be 'typical' university students and will equip them with the skills and experience needed for an undergraduate degree course.

The one-year programme is taught at QCA Level 3 – the equivalent of A-levels or an Access to HE Diploma – and introduces students to a broad range of study skills that are essential for studying arts and humanities at undergraduate level.

The programme is open to anyone who has the motivation to complete the course and go on to further study, regardless of ethnic, educational, professional or social background.

Encouraging achievement in young people

The University plays a key role in raising aspirations among young people. Two examples of innovative activities driven by the University are:

// Bristol Prize

The University has created a new award to honour the achievements of schoolchildren from Bristol and give them an insight into higher education. The Bristol Prize is awarded to pupils whose teachers feel have made a significant contribution over the year, both through academic achievement or progress and by demonstrating excellence in leadership, creativity, innovation or entrepreneurship, service to the community or working to achieve quality.

This year a total of 32 youngsters, aged 12 and 13, from 16 schools were given the opportunity to 'graduate' from the University. Pupils were given a taste of University life through a hands-on workshop before listening to an English lecture on medieval literature.

The University hopes that the Bristol Prize will become an annual highlight for schools and pupils and has pledged to keep in touch with the winners throughout their education.

// Discover More

As part of its commitment to raising aspirations among young people, the University has created a unique magazine for schools.

Discover More brings to life a wide variety of research as well as providing a glimpse into the array of opportunities that university life offers. It was also one of the first magazines in the UK to include Augmented Reality (AR) technology in order to bring an extra dimension to its content.

David Alder, the University's Director of Marketing & Communications, said: "Creating *Discover More* was an exhilarating journey and it's quickly become a popular source of additional information for schools. Key to its success has been the involvement of school pupils in its development. This most definitely helped to shape the end result which, as is so often the case when working in partnership, exceeded our initial expectations."

Open education

Bristol joined the Universities of Birmingham, Cardiff, East Anglia, Exeter, King's College London, Lancaster, Leeds, Southampton, St Andrews and Warwick in signing up to FutureLearn Ltd, a new company launched by the Open University (OU).

FutureLearn will give individuals from across the world greater access to higher education by bringing together a range of free online courses that are clear, accessible and easy to use. It will draw on the OU's decades of expertise in delivering distance learning and pioneering open education resources to underpin a unified, coherent offer from all its partners.

Our students

Bristol expects the best for and from its students and their achievements are very often remarkable. We recognise the importance of extracurricular activities and our students embrace these with focus and energy. Sporting achievements, one of the largest number of student societies in any UK university, an average of over £100,000 raised annually for local charities and over 100,000 hours contributed each year to volunteering projects, are just some examples of our students' achievements outside of a highly challenging curriculum.

Student media

The University's student body is responsible for the management and day-to-day running of a range of successful media products, all of which is done on a voluntary basis and in addition to students' full-time studies.

Epigram is the University's fortnightly student newspaper with a circulation of around 6,000; Burst Radio broadcasts continuously during term time from its production and recording studios located in the Richmond Building; UBTV was formed in March 2012 and produces regular shows focusing on student achievements; and *Helicon* is an online and printed arts and listings magazine that has been running for over a decade.

Students from a range of academic backgrounds are able to gain a wealth of experience to help them embark on a career in the media and a number of well-known alumni made their start this way. For example, former Burst volunteers include comedian Marcus Brigstocke, UBTV presenter Lindsey Russell has been announced as the next presenter of *Blue Peter*, and the BBC's deputy political editor James Landale used to write for *Epigram*.

Sporting achievements

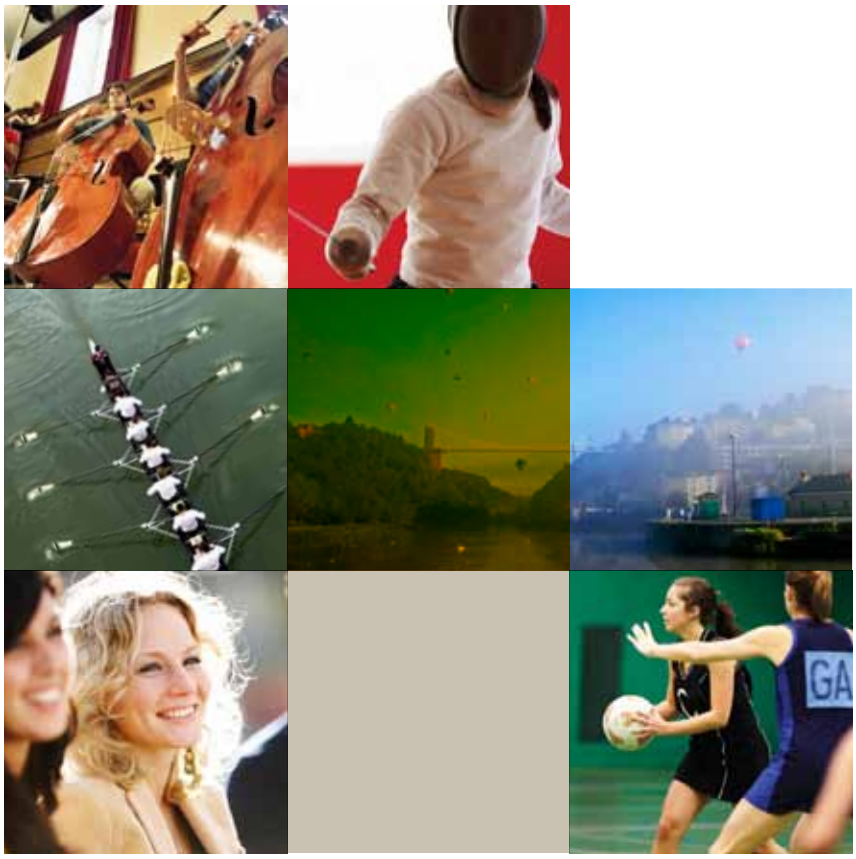
The University boasts a rich variety of sports clubs offering students the opportunity to follow their passions outside of the academic arena. There are 53 clubs in total with over 4,000 members taking part in activities ranging from clay pigeon shooting to korfball, and the University is proud to have consistently turned out a number of professional athletes and Olympians.

Exceptionally talented students are supported by way of the University's High Performance Squad, which aims to help athletes continue with their sporting careers without compromising their academic progress. In addition, the University awards the Bristol Red to individuals who have produced

exceptional performance in their chosen sport and whose level of achievement and commitment goes beyond University first team level.

Previous recipients have included England rugby player Kyran Bracken MBE and Olympic gold medal winners Laura Tomlinson MBE (née Bechtolsheimer) and Iain Percy OBE. In 2013 Reds were awarded to Camilla Paget (lacrosse), Sebastian Tjournelund (rowing coxswain), Joanna Leigh (hockey), Jasmine Barkes (lacrosse), James Stephenson (rugby) and Benjamin McSweeney (rowing).

Participation in sports continues to grow and initiatives like UBU Active and Fit and Fabulous give students the opportunity to try a range of free or affordable non-competitive activities. Likewise the Intramural Sports Programme focuses on participation and enjoyment through its series of leagues and competitions played at a purely recreational level.



"The University of Bristol students creating a world-class student life for themselves"

Student societies

There are over 200 student societies being run and managed by University students – one of the largest number on offer in any UK university – with a great variety of subjects being covered, from departmental societies (law, history, politics, etc) to performing arts, food and drink, wellbeing, religion and more.

Students are encouraged to create and run these groups independently and in addition to their full-time study, furthering the Students' Union's (UBU) vision of "The University of Bristol students creating a world-class student life for themselves".

The University recognises the importance of societies in giving students the chance to socialise, meet like-minded people and explore hobbies and interests unrelated to their academic studies. Being part of a society can also help students build some of the skills they may need in their future lives and careers, from organisation to leadership and people management, and can pave the way for career opportunities in many sectors.

Volunteering in the community

Each year our students contribute significantly through volunteering projects across the region. They get involved in a variety of ways, from joining existing sports and educational projects to taking part in community programmes, joining national initiatives or by setting up volunteering projects of their own. The UBU holds a Volunteers' Fair every year, where students can learn about the many volunteering opportunities available.

Students also take part in a diverse range of fundraising activities, helping to raise thousands of pounds for local charities annually. The University runs one of the biggest and most successful RAG (Raising and Giving) Weeks in the country and last year students raised over £134,000 through various activities.

The University hosts two awards evenings every year to recognise and celebrate the achievements of its student volunteers. The RAG and Volunteering Awards presents awards like 'most enthusiastic' and 'most engaged project coordinator' while the Bristol PLuS Awards honours students who have gained professional and life skills through their involvement in extra-curricular experiences.

By getting involved in volunteering activities, students are able to make a difference to the community, develop valuable skills that can enhance their chosen career and gain recognition for their extraordinary achievements.

Honorary degrees

The University considers the awarding of an honorary degree as one of higher education's most significant accolades. Each year, following very careful consideration, the University bestows a number of honorary degrees on individuals who merit special recognition for outstanding achievement and distinction in a field or activity which reflects the University's high standards and values.

// January

Professor Jean Golding
(Doctor of Laws/LLD)
Martyn Brabbins
(Doctor of Music/DMus)
Dr Charles Wong
(Doctor of Laws/LLD)
Dr Caroline Harper
(Doctor of Science/DSc)
Professor Anne Phillips
(Doctor of Laws/LLD)
John Rutley (Doctor of Laws/LLD)

// Beijing (April)

Professor Yang Wei
(Doctor of Laws/LLD)

// July

Tony Juniper (Doctor of Science/DSc)
Roger Holmes (Doctor of Laws/LLD)
Professor David Townsend
(Doctor of Science/DSc)
Professor Lynn Gladden, CBE
(Doctor of Science/DSc)
Professor Dame Carol Robinson, FRS (Doctor of Science/DSc)
Dr Anthony Falconer
(Doctor of Science/DSc)
Dr Roger Pettman
(Doctor of Science/DSc)
Professor Joe Brownlie, CBE
(Doctor of Laws/LLD)
James Landale (Doctor of Laws/LLD)
Professor David Feldman, FBA
(Doctor of Laws/LLD)
Laura Tomlinson, MBE
(Doctor of Laws/LLD)
Andrew Hilton
(Doctor of Letters/DLitt)

Investing in our estate

The University continues to invest in its estate to ensure it provides the best research and teaching facilities that befit a university of its standing. Its current programme of activities will deliver in excess of £150 million worth of development from now until the end of 2014.

// Life Sciences

A total of £56.5 million is being invested in our new Life Sciences Building. This will be a flagship building for the University and it represents one of our most significant investments in our estate. It will provide state-of-the-art teaching labs, a range of formal and informal learning areas, an atrium social space, a new BioSciences library and research space.

// Richmond Building

We are putting significant investment into our Richmond Building (which houses the Students' Union). Phases 1 and 2 have been completed, delivering a new swimming pool and changing facilities, a new foyer and improvements to the building's heating, cooling and IT facilities. In addition, the Anson Rooms have been refitted with folding acoustic screens, a new multi-purpose studio, and club and society areas. Phase 3 is due to be completed in September 2014 and will provide a new café, the renovation of the building's Winston Theatre (complete with cinema screen), a new studio theatre and a range of meeting and social spaces. The entire building will be wireless enabled.

Student study spaces

A new student learning zone in the Hawthorns was unveiled this year, enabling the two refectories to be used more easily for study. Improvements include new equipment such as fixed computers, plasma screens and colour printers, as well as wireless connectivity across the facility. Work has also been completed at the Wills Memorial Library to provide a wireless environment in all areas as well as improved lighting and power points for laptops.

Student accommodation

Other work completed this year includes the renovation of the kitchens and 70 bedrooms at Churchill Hall, renovation of bathrooms at Clifton Hill House and bedrooms at Goldney Hall, and a complete renovation of Manor Hall. Works at Hiatt Baker Hall include an extension to provide an additional 327 bedrooms and renovations to the catering area, main entrance and library. Work is due to be completed in 2014.

Environmental efforts

Bristol's efforts to be an environmentally friendly university have been recognised by People & Planet, a student-led network that campaigns to protect the environment.

In the UK's only comprehensive green ranking of universities, Bristol was placed 23rd out of 143 universities and given a First Class Award for the "creativity and tenacity" of its staff and students in implementing new initiatives and improving sustainability.

Some of the measures recognised include implementing energy-saving projects to save 2,000 tonnes of CO_2 every year and recycling 75 tonnes of waste electrical and electronic equipment, 16 tonnes of cardboard and two tonnes of polystyrene.

Bristol alumni

Bristol alumni are an exceptional group of individuals. Below, we have highlighted just some of our alumni's recent achievements.

Ed Woodward (BSc 1993) was announced as CEO of Manchester United Football Club.

Dr Nithin Thomas (MEng 2005, PhD 2010) won the prestigious Shell LiveWIRE 2012 Innovation Award for his work in data security.

Joseph Muscat (PhD 2008) was elected as Malta's youngest Prime Minister in the March 2013 general election.

Anne C McClain (MSc 2005) has been announced as part of NASA's new team of trainee astronauts who will explore new destinations in the solar system, including an asteroid and Mars.

Mariah Griffin-Angus (LLM 2012) received a Global Changemaker Award in January, in recognition of her active engagement in the promotion of international cooperation and social justice.

Lindsey Russell (BA 2013) won a CBBC competition to be the 36th *Blue Peter* presenter, succeeding over 20,000 applicants.

Dame Victoria Sharp DBE (LLB 1978) is being promoted from the High Court to the High Court of Appeal by Her Majesty The Queen.

Nishtha Chugh (MSc 2011) was shortlisted in the prestigious Guardian International Development Journalism Competition 2013.

Tessa Morris-Suzuki (BA Hons 1972) has won the Academic Prize of the Fukuoka Prize, a prestigious International Japanese Award.

Stephen Briggs (BSc 1982) is the director of the conservation project Alvecote Wood, which won first prize in the Royal Forestry Society's Small Woodlands Excellence in Forestry Awards.

Holly Smale (BA 2004, MA 2006) secured an international contract with HarperCollins for *Geek Girl*, the first in a series of three novels aimed at teenagers, which was published in February 2013.

Steve Micklewright (BSc 1983, MSc 1991) has been appointed the new executive director of BirdLife Malta. Steve has previously worked for environmental organisations, including the World Wildlife Fund.

Centenary Campaign

Philanthropy continues to play an increasingly significant role in enabling us to achieve our mission and vision, and is now the University's fourth largest income stream after government grants, fees and research grant income.

The University's Centenary Campaign is due to come to a close at the end of 2014 and with £94 million raised to date, we are currently on track to achieve our £100 million target.

Donations, grants and legacies have been of all sizes and support has come from 91 countries, from alumni, friends, trusts and foundations, and companies whose interests and values align with ours. We have received donations from a total of 19,012 donors to date, and the transformative impact of this ambitious campaign has resonated right across the University.

A total of £23 million has been donated in support of medical research alone. This has been used to support cancer research projects, to help continue pioneering stem cell research, and to fund a database collecting the brains of 850 dementia sufferers that will aid our understanding of dementia and inform potential new treatment options.

In addition, philanthropy has helped us in many aspects of our academic endeavour, from influencing policymaking by contributing to the work of the Intergovernmental Panel on Climate Change, to acquiring the world-renowned Mander and Mitchenson Theatre Collection.

Donations have also helped us to inspire and educate generations of students who may never have had the chance or the belief that they could access a university education before.

We are hugely grateful to every donor who has played a part in contributing to the Centenary Campaign. Thank you.

Philanthropy

Bristol Pioneers are individual donors who give £1,000 or more a year. In recognition of their generosity, we have listed some of our Bristol Pioneers below.

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A further 32 Bristol Pioneers have asked to remain anonymous.

We'd also like to thank the following organisations that have made significant contributions to the University in 2012/13:

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