Global Challenges

The stories in this review are arranged around global challenges, the major issues the world faces that the University of Leicester has particular expertise to help address.

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Building a Safe and Just World
From providing post-conflict countries the means to rebuild communities to black-letter research on law: Leicester’s research in this area is deep and extensive, offering practical solutions to this global challenge.

Strengthening Inter-Cultural Relations and Communities
The world we know is becoming smaller, so it is increasingly important that we look at how we interact with other cultures and support their growth, as well as strengthening the local communities around us.

Understanding Change in Culture and Society
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Spin Out Activity
Transforming technological inventions developed from the University of Leicester’s research and expertise.
Introduction

I’m delighted to present the University of Leicester’s first review covering the enterprising work we’ve been involved in with business and industry.

The University of Leicester is one of the world’s top universities, consistently ranked in global top 200 lists. We work nationally and internationally with companies, reflecting our research expertise; but we are also committed to helping small and medium sized businesses locally and throughout the East Midlands.

Universities and businesses working in partnership provide a wealth of benefits to all involved. For businesses, access to world-leading academics and the latest technology can help them develop and grow in a low-risk way.

With support packages designed to help local companies, many small businesses are now able to access resources and skills previously unavailable to them, boosting our local and national economy.

For the University of Leicester, opening up to industry has enabled our excellent research to find applications in the real world much quicker, whilst creating new opportunities for collaborative work with industrial partners and providing case studies for teaching. Additionally, close ties with businesses allow us to create opportunities for our students, such as internships and work experience, equipping them with a wide range of academic and work-based skills which are essential in the ever-more competitive graduate job market.

The University of Leicester continually looks for new ways to expand and deepen work with industry. We are particularly excited about our involvement in new Doctoral Training Centres in Materials Science (IMPACT), Forensic Sciences (Intrepid) and Arts and Humanities (Midlands3Cities). These centres will provide training for PhD students with a strong industry element, offering students the chance to apply their studies in a real-world setting, and providing businesses in the Midlands with centres of excellence for commissioning research and collaboration.

Engagement with business and industry is supported by the University’s Enterprise and Business Development team, with support from academics from around the University who have significant experience of working with businesses who encourage other academics to engage with industry. Five new industry fellows have also been appointed in subjects ranging from heritage to space science.

With experts in each subject area looking after business development, intellectual property, technology transfer, professional development and regeneration we offer businesses a hassle-free way to work with us, whatever service they require.

Within this report are a number of case studies, which I hope will give you a flavour of some of the excellent projects we have been involved in recently.

Professor Kevin Schürer
Pro-Vice-Chancellor for Research and Enterprise
Three NHS and University research partnerships in Leicester have been awarded a combined £15.5 million in funding to help them to develop and translate new scientific discoveries into ground-breaking medicines and better care for patients. This is part of the UK’s largest ever investment in early stage health research, funding advances in disease diagnosis, prevention and treatment.

University Hospitals of Leicester NHS Trust has two awards with the University of Leicester, and one with the universities of Loughborough and Leicester, focusing on cardiovascular disease, respiratory disease, and nutrition, diet and lifestyle – research areas in which Leicester has an enviable international reputation.

The £800 million programme through the National Institute for Health Research (NIHR) is part of the Government’s £4 billion investment in research and development.

Awards were made to NHS Trusts working in partnership with universities with an outstanding track record of research excellence, and were based on the scale and nature of the proposed research and its anticipated benefit for NHS patients.

This investment will see scientists in Leicester contribute to the UK-wide development of exciting new science into tangible, effective treatments that can be used across the NHS. It means that patients will see real improvements in early diagnosis, survival rates and living a more independent and better quality life.

Andrew Lansley,
Former Secretary of State for Health

Fighting Ill Health and Disease
Leading biomedical research into global health concerns
Cardiovascular sciences

Professor Nilesh Samani, Director of the Leicester Cardiovascular Biomedical Research Unit and British Heart Foundation Professor of Cardiology at the University and Glenfield Hospital said: “The £6.5 million award for renewal of our Unit is a vindication of the quality of cardiovascular research being done by the partnership of the University of Leicester and University Hospitals of Leicester NHS Trust. Cardiovascular research undertaken in Leicester has already had a major impact on the health and well-being of patients not only locally but worldwide.”

Respiratory disease

Professor Andrew Wardlaw, Professor of Allergy and Respiratory Medicine and Director of the Institute for Lung Health at the University and University Hospitals of Leicester, said: “The Leicester respiratory community is absolutely delighted to have been awarded an NIHR Biomedical Research Unit (BRU), with funding of £4.5 million.

“One of the central aims of the BRU is to help develop new medicines, starting with an original idea, often based on laboratory work, and then taking the treatment into the clinic by involving patients in clinical trials. We have always placed great emphasis on making our research relevant to patients and developing a close collaboration between the University and the NHS with researchers from both institutions working together.”

Managing high blood pressure

Researchers from the NIHR Leicester Cardiovascular Biomedical Research Unit have led a study looking at drug compliance for patients taking drugs to lower their blood pressure.

The team analysed the samples for a wide range of the most commonly prescribed drugs to treat high blood pressure and found that a quarter of people evaluated at a hypertension clinic either did not take their medicines at all, or only took them some of the time – resulting in higher blood pressure.

There was a direct association between blood pressure readings and the number of drugs detected, with the lowest readings among those taking all their prescribed medication.

The findings suggest that in order to keep blood pressure low, patients need be consistent in taking their medication. This information will help doctors guide their patients to manage their blood pressure effectively.

Nutrition, diet and lifestyle

University Hospitals of Leicester in partnership with Loughborough University and the University of Leicester received funding of £4.5 million to establish a National Centre for Biomedical Research in Nutrition, Diet and Lifestyle. This is one of only two such units funded in the country and recognises Leicester and Loughborough’s international expertise in this field.

Professor Melanie Davies said: “The research will focus on physical inactivity as it is estimated to be the fourth leading cause of death globally and our research will particularly include subjects from minority ethnic groups and young people at the highest risk of chronic diseases. The award of this BRU will allow us to become an International Centre of Research Excellence undertaking the full spectrum of lifestyle research which we believe will make a real difference, not only to people in the East Midlands but nationally and internationally.”

LYDIA study

The LYDIA study is investigating the impact of Liraglutide, a drug used to improve control of blood glucose, on cardiac function in young adults with type 2 diabetes in comparison to other similar drugs.

Type 2 diabetes has recently become much more common in younger adults (those under 50 years of age). It has been found that people who develop type 2 diabetes as young adults have a more aggressive form of the condition, compared to those diagnosed later in life. One of the most serious effects of type 2 diabetes in younger adults is impaired cardiac health, leading to an increased risk of heart attacks and reduced cardiac function.

Researchers from the Nutrition, Diet and Lifestyle BRU are exploring which drug controls the condition the best, enabling doctors to prescribe medications that fit the specific needs of this patient group.
Scientists from our Department of Infection, Immunity and Inflammation have isolated viruses that eat bacteria to specifically target the highly infectious hospital superbug Clostridium difficile (C. diff).

The research has led to a collaboration between the University of Leicester, the University of Glasgow and AmpliPhi Biosciences Corporation that will lead to the use of bacteriophages for treating the superbug C. diff infections.

Dr Martha Clokie has been investigating an alternative approach to antibiotics, which utilises naturally occurring viruses called bacteriophages, meaning ‘eaters of bacteria’.

The work has predominantly been funded by the Medical Research Council (MRC).

Dr Clokie said: “Ever since the discovery of the first antibiotic, penicillin, antibiotics have been heralded as the ‘silver bullets’ of medicine.

“But less than a century following their discovery, the future impact of antibiotics is dwindling at a pace that no one anticipated, with more and more bacteria out-smarting these miracle drugs. One alternative to antibiotics is bacteriophages.”

Dr. Clokie and her team have isolated and characterised the largest known set of distinct C. diff phages that infect clinically relevant strains of C. diff. Of these, a specific mixture of phages have been proved to be effective against 90% of the most clinically relevant C. diff strains currently seen in the UK.

The phages, which are the subject of a patent application, have been licensed to AmpliPhi Biosciences Corporation – a US-based biopharmaceutical company and a pioneer in developing phage-based therapeutics.

AmpliPhi are funding further development and testing of C. diff phages developed by Dr Clokie. The goal is to have a phage mixture ready to go into phase 1 and 2 clinical trials. This will involve optimising phage preparations for maximum efficacy against C. diff infections from around the globe and establishing production, storage and delivery systems for the phage mixture. Evaluations of the efficacy of bacteriophage therapy and optimisation of dosing regimes will be carried out in collaboration with the University of Glasgow.

Phil Young, CEO and President of AmpliPhi, said “We are very excited about this partnership with Dr. Clokie and the University of Leicester. Phage-based therapy has the potential to revolutionise the way C. diff infections are treated in the clinic, in compliance with the regulatory frameworks already in place. We firmly believe that this collaboration may result in a treatment that could benefit patients, clinicians and healthcare organisations alike.”

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The University of Leicester has been awarded four prestigious Industrial CASE Studentships to support cutting-edge research into some of today’s most pressing medical and biological challenges.

The studentships will fund four-year collaborative PhD projects supervised jointly by a member of academic staff and an industrial partner. Studentships are principally based at the University with a placement at the company.

The Biotechnology and Biological Sciences Research Council (BBSRC) and Medical Research Council (MRC) fund up to 90 and 30 Industrial CASE Studentships respectively, with additional support and involvement from an industrial partner.

The PhD projects at Leicester include:

- The Centre for Genetic Architecture of Complex Traits will work with the SABMiller experimental brewery to perform quantitative genetic analysis of brewing strains of yeast for the first time. The hybrid nature of brewing yeast has prevented such analysis in the past. The project will allow geneticists to identify particular genetic characteristics of yeast and to develop new brewing hybrids of benefit to the brewing industry as well as open the door to the genetic analysis of hybrids in general. The project is led by Professor Ed Louis and funded by the BBSRC.

- A Medical Research Council CASE Studentship held jointly by Dr Simon Wagner, of the Department of Cancer Studies and Molecular Medicine, and Domainex, an innovative drug discovery company based in Cambridge. Building on the discovery of a potential survival pathway in a common type of non-Hodgkin’s lymphoma, the project will use novel agents developed by Domainex to understand the mechanism of the drugs’ action and define patient groups that are most likely to benefit.

- Dr Richard Bayliss and Professor Mark Carr from the Department of Biochemistry are working with MRC Technology to develop an alternative approach to the development of new drugs that block kinase activity, funded by the BBSRC. Protein kinases are the most frequently dysregulated family of proteins in human cancer. The project will investigate the mechanisms by which the activity of an individual kinase molecule is controlled, and develop chemical compounds that block these processes. These molecules will be developed into drug candidates through the collaboration with MRC Technology.

- Dr Primrose Freestone of the Department of Infection, Immunity & Inflammation will supervise a project with Dr Suzanne Jordan at Campden BRI on improving the food safety of salads. It will lead to a better understanding of the interaction between food-borne pathogens such as Salmonella and chemicals released from salad produce, and the resident microflora on the plant tissue surface. The student will be able to evaluate their University of Leicester findings using industrial-scale salad processing and washing systems at Campden BRI. The project is funded by the BBSRC.

Professor David Wynford-Thomas, Dean of Medicine, said: “We’re incredibly pleased that we have secured a record number of Industrial CASE Studentships this year. “These studentships provide additional vocational skills not otherwise learnt on a regular PhD and are great preparation for both academic and industrial careers. “They will also help the University of Leicester to build more relationships with industry and potentially encourage more collaborative work. Studentships help to get the latest academic research transferred into industry and are a great opportunity to collect feedback about research and technology from our industrial partners.”
Constructing our World

High-tech facilities to support UK industry
The University’s Advanced Structural Dynamics Evaluation Centre, or ASDEC, is a new commercial facility, based at the Motor Industry Research Association’s (MIRA) ambitious £300 million Technology Park near Hinckley, Leicestershire.

ASDEC represents £2.5 million of investment and has been supported by the Government’s Regional Growth Fund and the European Regional Development Fund, delivered in partnership with Polytec, a leading company in laser vibrometry equipment.

The Centre is the UK’s first commercially available 3D laser structural dynamics vibration testing and analysis centre for the automotive, aerospace and space industries. It offers collaborative research and development and independent commercial 3D laser interferometry scanning measurement and modal analysis, modelling and certification services.

ASDEC works using three robot-mounted laser scanners, which make non-contact vibration measurements of a surface, measuring anything from small components to whole vehicles. The laser beam is directed at a surface and the vibration amplitude and frequency are extracted from the laser beam frequency caused by the motion of the surface being measured.

The facility is a highly specialised resource to support the development of new products and processes. It offers reliable, cost effective, synthesised system-level models to accurately predict the optimum design solutions for engineering components such as nano-actuators and aircraft fuselage sections, through to structures such as the vibration comfort of a complete vehicle, the fatigue resistance of an aircraft landing gear, or the structural integrity of an aircraft or satellite.

The centre helps companies reduce costs whilst introducing innovative designs and new materials to make their products more profitable and sustainable. The facility enables this through a high performance development process.

The academic lead for the project is Professor Sarah Hainsworth, Professor in Materials Engineering and the head of the University’s industry-facing Materials Technology Integration Centre. She said: “This is a very important development for the University of Leicester. It makes it possible for us to work with more companies interested in innovation and growth; and for them to have access to the world-class expertise at the University of Leicester and the partners who have been behind this bid.”

The creation of a world leading centre of excellence in vibrometry will help the region to build and grow the knowledge economy while developing high level skills through graduate internships, knowledge exchange and technology transfer activities.

Adrian Harrison, MD of Polytec UK said: “This project represents a unique opportunity for the University of Leicester, the region and the whole of the UK engineering and automotive industries to gain access to world leading technology in the field of vibration measurement and analysis. It is a project which Polytec Ltd and their parent company Polytec GmbH are very pleased to be supporting and involved with.”
New methods of monitoring air pollution

Earth observation scientists from our Department of Physics and Astronomy are working in partnership with Leicestershire-based Bluesky International Ltd, aerial survey specialists, to measure air pollution using cutting edge technology developed at Leicester.

Building on Leicester’s highly successful CityScan project, in which 3D maps of air pollution were built over cities including London during the 2012 Olympic Games, the technology has been developed for airborne use and installed in planes to take aerial readings.

The sophisticated air quality measuring spectrometer has been used to produce striking ‘heatmap’ style images of pollution levels in Leicester as part of the Airborne Air Quality Mapper project.

The Compact Air Quality Spectrometer device monitors visible light and measures how much light is lost at specific wavelengths absorbed by NO₂. Development of the instrument took place with Surrey Satellite Technology Ltd and was funded by the UK’s Centre for Earth Observation Instrumentation and the Natural Environment Research Council.

The device gives a reading for NO₂ levels between the ground and the plane, the readings are then collated and the results overlaid over Google Earth to give a remarkably detailed map of air quality.

Further to monitoring air pollution, the University of Leicester has continued its partnership with Bluesky International Ltd, developing the world’s first integrated night mapping system to measure light pollution.
The University of Leicester, through the Departments of Engineering, Mathematics and Computer Science has entered a collaborative framework agreement with international engineering company Alstom.

The agreement will see the parties collaborate in areas of research related to energy hardware and infrastructure using a range of mechanisms, including contract research, consultancy, Knowledge Transfer Partnerships (KTP), student projects, UK Technology Strategy Board and EU Horizon 2020. The partnership will actively explore opportunities for broader provision of training within Alstom and recruitment of Leicester graduates.

Professor Helen Atkinson, Head of the Department of Engineering at the University of Leicester, said: “We have worked collaboratively with Alstom for a number of years on research that explores the potential use of new materials and technologies in steam turbines which have the capacity to increase power plant efficiency and reduce CO₂ emissions. It is exciting to research in areas that have a direct benefit to solving challenging issues affecting our environment and planet. The partnership formally gives us a platform to explore new opportunities.”

Iain Rutherford, Alstom Unit Managing Director said: “While Alstom is primarily concerned with the development of new and innovative technologies, we are also passionate about closing the skills gaps both of today and for the future to service the evolving needs of the power industry.

“Academic partnerships, such as this one with the University of Leicester, therefore not only support young engineers and scientists with the essential skills and competencies to enter industry but also develop their theoretical knowledge necessary to extend the required technologies of tomorrow. Additionally, it ensures that the academic staff and the Universities themselves are better prepared to support the future direction and needs of the sector. I’m delighted to be able to help launch this partnership and look forward to working together long into the future.”

The University of Leicester has a number of active links with Alstom. The Department of Engineering supports research and development at Alstom Grid through its Power Group and Alstom Power through its Mechanics of Materials Group and Thermo Fluids Group. The Department of Mathematics also works with Alstom Power, providing interns to the Methodology for Tools Group.
In many conflict-affected countries, there is a wealth of cultural heritage that has the potential to act as a focus for community-building, reconciliation, and national cohesion. The work of heritage professionals can play a significant role in rebuilding countries affected by conflict. Heritage sites can be managed in a way that encourages tourism, securing income and investment to help with economic recovery.

As a specialist in the archaeology of the Roman Empire, and Roman Africa in particular, Professor David Mattingly from our School of Archaeology and Ancient History has been running research projects in North Africa for many years. He has developed good relationships with government departments and commercial companies working in Libya and these have developed into discussions and projects looking at how archaeology and cultural heritage can assist in economic and social development, particularly in post-conflict countries.

With the belief that the past can help to build a better future, Professor Mattingly set up the Cultural Heritage and Peacebuilding (CHaP) project with Dr Naoise MacSweeney. Existing relationships with the Libyan Government Department of Antiquities and commercial companies working in the area led to a shared interest in the potential of cultural heritage to rebuild society after conflicts; creating new shared understandings of the past, stimulating local development and providing educational and employment opportunities at different levels.

Professor Mattingly has developed a partnership for the delivery of the CHaP Project with charity International Alert, a leading organisation in the design and delivery of specialised training for professionals engaged in peacebuilding, state building and development in conflict-affected and fragile countries. CHaP is developing training courses about the key aspects of conflict sensitivity for heritage professionals working in conflict-affected countries, delivered by our world-leading academics who are at the forefront of heritage research. The courses are designed for heritage professionals working in roles such as archaeologists, museum curators, staff of governmental and non-governmental organisations, consultants and academics.

As each conflict situation is different the courses are bespoke, interactive and tailored to the individual needs of our clients. Our academics work closely with each organisation to assess their needs and develop the programmes, from half-day training sessions through to multiple-days residential programmes delivered in locations convenient to the client.
Improving the rights of European consumers through consultancy

The growth of online purchasing, often from international suppliers, is increasing – as are the numbers of disputes arising from these transactions. With the aim of increasing consumer trust, the EU has acknowledged the need to promote better suited, informal alternative dispute resolution (ADR) mechanisms such as arbitration, mediation and ombudsmen schemes.

Senior Lecturer in Civil Justice in our School of Law, Dr Pablo Cortés, has conducted research into the establishment of legal standards for online ADR, which led him to be hired in 2011 as a consultant by the European Commission (DG SANCO) during the drafting of legislation. The new legislation, approved in 2013, strengthens the rights of half a billion European consumers by guaranteeing the availability and online access of quality ADR mechanisms for settling contractual disputes between consumers and traders.

Dr Cortés is currently carrying out research for the European Commission (DG JUSTICE) to carry out research on online mediation. This research will involve the design of model online mediation procedures suited for resolving cross-border disputes, a blueprint for European legislation on online mediation, and a European code of conduct for online mediators. The final report for this research will be published by the European Commission and it is hoped to form the building blocks for new European legislation in this emerging field.

Helping retail organisations manage their losses

Globally, the impact of loss within organisations is profound, with estimates suggesting the retail sector loses approximately $232 billion a year.

This can take the form of internal and external theft, inter-company fraud and a whole range of process-related losses. Traditional approaches have typically focused upon responding to the symptoms of these losses usually through technological fixes such as product tags and CCTV, which have a short-lived impact as offenders quickly find ways to defeat new interventions.

Professor Adrian Beck, Head of the Department of Criminology, has focused his research around helping organisations to better understand the root causes of these losses. His work as academic advisor to the Efficient Consumer Response (ECR) Europe Shrinkage Group (a joint retailer/manufacturer representative body) has provided retail organisations across the globe including Adidas, Proctor & Gamble, Sainsbury’s, Tesco, and Walmart with new insights, tools and techniques to more effectively measure, monitor and control the problem of loss, enabling them to make multi-billion pound savings.

The ECR Europe Loss Prevention Road Map is a sophisticated business tool that uses techniques such as process mapping and failure mode effect analysis to help organisations identify ways to reduce shrinkage.

Beck’s research found that non-theft losses such as error and damage to stock could account for up to 70% of shrinkage. He works with organisations to review their operational processes, helping to eliminate those that lead to shrinkage, rather than reacting after losses have occurred.

This work is on-going as new processes and operations develop within retailing such as self-scan and mobile checkouts that present new opportunities for loss to occur. Professor Beck’s more recent work has looked at how these new technologies can change offending behaviour and how organisations can redesign business practices to respond to these new and evolving risks.
Strengthening Inter-Cultural Relations and Communities

Workforce development in Saudi Arabia
Learning doesn’t necessarily end upon leaving school or university. Our world-leading academics are engaged in the continuous professional development of staff within companies embedding their expertise into industry. This support helps businesses around the world develop their staff, and in turn improve their business performance and profitability.

Ma’aden, Saudi Arabia’s largest mining company, operates in four key business areas: gold and base metals, phosphate, aluminium and industrial minerals. The company is less than 20 years old and their vision is to be a world-class minerals enterprise. In order to achieve this, Ma’aden recognised the need for a management development programme for their phosphate business that was both a recognised qualification and tailored to the specific needs of their organisation.

Following a successful tendering process, academics from our internationally-renowned School of Management worked with Ma’aden to fully understand their needs and expectations of the management development programme. This process developed our knowledge of the Ma’aden business and its key challenges which allowed academics to design a programme that would have maximum impact. The Ma’aden management development programme designed by Leicester offered a tailored MBA delivered by distance learning together with a series of bespoke leadership workshops delivered face-to-face 10 times throughout the two-year programme. In addition, one-to-one coaching was provided to all delegates both face-to-face and via telephone or Skype. The coaching aspect allowed the managers space to reflect on their learning and management practice and to explore ways in which they might implement their learning to further enhance their impact on the business and achieve their personal potential.

Feedback from participants:

The course has helped develop relationships, trust and co-operation between team members.

I now have an appreciation of leadership success factors – situational flexibility, character, qualities, and honesty.

It has opened our minds and given us a desire to pursue new markets.
River restoration in Market Harborough

The Welland Rivers Trust seeks to make people aware of the River Welland and its uses, to restore its lost natural value and to help people to use the river sustainably. Once restored, the river will become a focal point of natural beauty.

‘Welland for People and Wildlife’ is one of the many projects supported by the trust and was set up to restore the 1.5km stretch of the River Welland which runs through Market Harborough, Leicestershire, from Welland Park.

University of Leicester biologist Professor David Harper, expert in applied water ecology and conservation, is the Trust’s Honorary Secretary and is the Project Scientist.

Professor Harper secured funding for the project by applying to Defra’s Catchment Restoration Fund in partnership with the University’s Centre for Landscape & Climate Research, The Environment Agency and Harborough District Council. The University was also able to help fund project staff and academic time through its Innovation Partnerships programme (part funded by the ERDF).

Professor Harper said: “Success will be apparent when sightings of otters and kingfishers are too frequent for the newspapers and radio to bother with the reports; when unusual damselflies such as the ‘white-legged’ are seen patrolling territories along the banks in the summer and people’s idea of a good summer afternoon is to walk along the river bank as children paddle in the gravel and shriek with delight.”

This is another good example of the University reaching out to the community and using its skills to benefit people and nature in the counties that surround it.

Professor David Harper, Project Scientist

A £500,000 river conservation project in Market Harborough, Leicestershire, will restore a 1.5km stretch of the River Welland.
Languages for businesses and communities

As businesses increasingly seek opportunities overseas and multinational companies promote staff between regional bases, workforce language skills are becoming increasingly important.

The University of Leicester’s School of Modern Languages is developing a new offer for businesses, with a comprehensive package of courses in a wide range of languages for companies of all sizes, available in classes taught on campus or bespoke programmes built around the client’s needs.

The courses develop the skills and knowledge required to do business in a specific region or country. Learners develop language skills and an understanding of etiquette and culture to ensure that business relationships flourish.

The National Youth Agency has benefitted from our language and culture courses. In preparation for training youth workers in Mozambique, the charity required Portuguese lessons and an insight into Mozambican culture. We provided private Portuguese tuition, tailored to the specific needs of their work, and one of our Mozambican students gave invaluable advice about culture and working practices in the country.

University language teachers have also worked with Gifted and Talented secondary school pupils at Babington Community College, Leicester, teaching Mandarin and Chinese culture classes.

The University of Leicester’s Mandarin Chinese tutor has delivered language and culture classes to the 159 students involved in Babington Community College’s Gifted and Talented Genius Club Programme. The students take part in a range of activities aimed to extend their knowledge and understanding of the wider world.

Mrs Henry-Shaw, Gifted and Talented Coordinator at Babington Community College said: “Mrs Hongyu White, a tutor from the University of Leicester, has played an integral role in delivering Mandarin to our students. We have many English as an Additional Language students that she has been teaching and so for many of these students this is their third language. They have enjoyed the diverse activities learning the language and understanding the culture of China. We hope to work with Mrs White next year in the same capacity.”
The University of Leicester takes an innovative, multi-disciplinary approach to many of its research and enterprise projects, utilising the broad base of expertise within the University to enable collaborative working between businesses and our academic departments and commercial services.

One of our busiest commercial operations is University of Leicester Archaeological Services (ULAS), an independent unit embedded in the School of Archaeology and Ancient History, which undertakes a wide range of commercial and research projects all over the UK.

The unit has undertaken a wide variety of large-scale archaeological projects from assessment to mitigation for major developments including road schemes, pipelines, airport extensions, mineral extraction and housing. They provide a consultancy and contracting service for numerous developers including the Highways Agency, Environment Agency, Severn Trent Water, Scottish Power and Wilson Bowden Properties as well as a number of mining and quarrying firms.

ULAS has particular expertise in urban archaeology and in achieving design solutions to enable development to proceed with minimal impact to underlying archaeology.

In 2011, Philippa Langley of the Richard III Society approached ULAS about conducting an archaeological exploration of the Greyfriars site in Leicester, an area that historians believed contained the remains of King Richard III. The Society was only able to provide a portion of the funding required and the University, although initially sceptical of the chances of finding Richard, saw great merit in discovering more about this important lost friary. Consequently the organisations decided to work together in partnership to search for the lost church of the Greyfriars and within it, potentially, King Richard III.

The search for the King took a huge step forward when the University’s archaeology team located the Franciscan
Friary where the King was reportedly buried after his defeat at the battle of Bosworth in 1485.

In September 2012 the University announced that human remains had been found: an adult male skeleton with obvious battle wounds and a pronounced curvature of the spine.

Although the evidence pointed to the discovery of King Richard III, the University conducted a thorough investigation of the remains to prove this beyond reasonable doubt. The project involved not only the School of Archaeology and Ancient History, and the School of Historical Studies; but also the Department of Genetics, Department of Engineering, Forensic Pathology Unit, School of English and Department of Psychology.

Leicester’s academics identified ten different wounds on the skeleton and their probable cause, the scoliosis (spine curvature), and carbon-dated the remains. Leicester’s world-leading expertise in post-mortem computer tomography enabled the creation of detailed 3D scans of the bones. The most eagerly awaited results were those of the DNA analysis. A living descendant of King Richard’s sister was identified and his mitochondrial DNA was found to match that extracted from a tooth of the skeleton.

On 4 February 2013 it was announced that the bones were indeed those of Richard III.

The Dig for Richard III was led by the University of Leicester, working with Leicester City Council and in association with the Richard III Society. The originator of the Search project was Philippa Langley of the Richard III Society.
Turning archives into assets through regeneration

Academics from the Centre for Urban History worked with Lizzie Munro, heritage interpretation designer of Munro & Whitten and creatives from Leicester’s Cultural Quarter on the heritage-led regeneration of a redundant building.

The imaginative use of period features and archival material led to the reinterpretation of Makers’ Yard – a Grade II listed former hosiery factory – and made it a desirable workspace for small creative businesses whilst bringing to life the history of the building.

To highlight the historical significance of the building, the team devised creative ways of telling its story. Rather than installing standard information boards, the team:

- Used listening posts for audio recordings of people who used to work in the building which broadcast from light fittings as people pass by
- Designed acrylic timelines which are displayed on the walls of the foyer showing who owned the building and what it was used for
- Commissioned a prototype app – a film with additional text, photos and video about the dying art of framework knitting, which was the starting point for the East Midlands hosiery industry

The exposure of period features and creative approach to interpreting its past are all part of the stripped-back style of the building which makes a virtue of its industrial history.

The building has filled up with tenants quickly since its opening in 2013 and Makers’ Yard won the 2013 ProCon Leicestershire award for Regeneration Project of the Year.

This project was one of the ‘Archives to Assets’ Creative Economy Knowledge Exchange Projects part-funded by the Arts & Humanities Research Council.

Training our teachers

Since 2004 the University of Leicester, through the Science Learning Centre East Midlands and now Education CPD+, has provided a programme of high quality, innovative professional development for primary, secondary and FE teachers as well as technicians and teaching assistants.

Sessions from our programme are presented by leading academics, scientists and educationalists bringing cutting edge research and innovative pedagogy into schools.

Over 10,000 people have accessed Science Teacher CPD+, with 97% of attendees rating the classes as ‘good’ or ‘very good’ and 99% of participants stating that they would recommend the courses to others.

The benefits of Science Teacher CPD+ are varied; for some participants it has been the springboard to a promotion or provided the skills to take on new challenges at work. Many schools have seen the levels of attainment in science rise significantly and interest in science greatly improved thanks to the creative and innovative science experiments shared on the courses.

Really clear ideas to take back to school to implement and move school forward. Particularly the support for planning and supporting assessment within activities – excellent! An excellent course, which will really help to refocus staff at the school.

One of our recent participants
Spin Out Activity

We have a number of spin-out companies transforming technological inventions developed from the University of Leicester’s research and expertise.

Axendos Ltd
The company is a joint venture between the University of Leicester and the Wellcome Trust set up in 2013. It is based on patented technology aimed at developing first in class therapies for Pneumococcal pneumonia.

BioAstral Ltd
BioAstral Ltd is a spin-out from the Department of Biology and the Space Research Centre that exploits new concepts in biomedical imaging using advanced photon detection and image analysis methods.

Founded in 2004, the company develops innovative, advanced space imaging technology with the needs of bioscientists in partnership with the University of Leicester and the European Space Agency.

Find out more: www.bioastral.com

Gamma Technologies Ltd
Gamma Technologies Ltd (GTL) is an East Midlands based company spun out from the Space Research Centre at the University of Leicester and Academic Medical Physics at the University of Nottingham.

GTL develops innovative high resolution imaging systems for use in clinical nuclear medicine, including the Mini Gamma Ray Camera (MGRC) intended for use within intensive care and operating theatres. The cameras offer high spatial resolution imaging and are easy to operate and portable, enabling point-of-care imaging.

The technology has a number of clinical applications, including:
- Sentinel lymph node imaging
- Intra-operative tumour localisation
- Renal transplant function
- Gastrointestinal transit
- Assessment of aspiration in acute stroke patients
- Lacrimal drainage (eye)
- Thyroid morphology

The Mini Gamma Ray Camera is currently undergoing clinical evaluation in the Queens Medical Centre in Nottingham where its performance is being assessed in a clinical environment. A small number of volunteer patients have already been imaged using a standard whole body camera and the Mini Gamma Ray Camera.

Find out more: www.gammatechnologies.co.uk

Haemostatix Ltd
Based at BioCity, Nottingham, Haemostatix Ltd was founded in 2003 as a spin-out from the University of Leicester. The company was established to commercialise a new scientific approach to enhancing blood clotting and to develop a synthetic substitute to donor platelets.

Key facts about Haemostatix:
- Focus on the treatment of bleeding
- Novel, proprietary platform technology
- Pipeline of topical and systemic haemostats
- Lead product PeproStat™ is a topical haemostat for the treatment of bleeding during surgery

Haemostatix has received authorisation from the UK regulator, MHRA, to commence a clinical trial of its lead product, PeproStat™. The product is the first of a new class of peptide-based coagulant designed to control bleeding during surgery, limiting blood loss, maintaining a clear surgical field and reducing operating time. Unlike the current market-leading product, PeproStat™ does not require a human donor or bovine blood and needs no preparation prior to use.

Find out more: www.haemostatix.com
Scionix Ltd

The University of Leicester’s Department of Chemistry entered a joint venture with Genacys Ltd to form Scionix Ltd in 1999, which commercialises the industrial use of ionic liquids.

Ionic liquids are salts that are in a liquid state at room temperature, which are highly polar and do not evaporate. They can solubilise compounds and salts which normally would only dissolve in highly corrosive or caustic aqueous solutions. These revolutionary solvents are cheap to produce and store and are unreactive to air and moisture. The technology is patent protected and covers over a million ionic liquids, making Scionix Ltd the world’s largest producer of ionic liquids.

Scionix Ltd’s services include chromium plating, metal polishing and reprocessing, arc-furnace dust recycling and cleaning products. The company has a large number of ongoing collaborations, among which are consumer product manufacturers, automotive and aerospace materials finishers, mining conglomerates and pharmaceutical companies.

Find out more: www.scionix.co.uk

OpenBrain Ltd

OpenBrain Ltd is a technology start-up building a novel platform for statistical computing. The company is a spin-out from the University of Leicester’s Department of Biology, where the core technology was developed, which was funded by the BBSRC.

OpenBrain Ltd has developed a next-generation computing platform for scientific and business analytics. Its aim is to develop an accessible platform for applying Bayesian Statistical models to real world problems in finance, enterprise, healthcare and life sciences.

The company offers a range of services, including data analysis and model building, data visualisation, operations management and training, as well as custom projects around quantitative analysis. OpenBrain’s platform is based on Baysig, a new statistical programming language. Baysig combines general-purpose computing with flexible statistical modelling for a wide range of data types.

Find out more: www.openbrain.co.uk

OCB Media Ltd

OCB Media Ltd is an award winning producer of online and optical (CD-ROM/DVD) based learning materials for doctors, nurses and healthcare professionals worldwide. Founded in 1996, the company aims to make e-learning more effective and affordable by:

- Helping academics, clinicians and industry develop high quality medical e-learning materials
- Ensuring that all developments are supported by an underlying evidence base
- Evaluating e-learning outputs and, where possible, assessing effectiveness and impact on practice

Services include content authoring tools, learning management systems, instructional design, hosting and support, and evaluation.

OCB Media Ltd has partnered with many respected healthcare organisations to develop a wide range of training materials, including the Department of Health, the Royal Colleges, Local Education and Training Boards, NICE, NHS Training for Innovation and numerous NHS Trusts.

Clients that OCB Media work with in the pharmaceutical industry include GlaxoSmithKline, Chiesi, Boehringer-Ingelheim, Astra Zeneca, Baxter Healthcare, Sanofi-Aventis, Linde Gas Therapeutics, Servier and Shire Pharmaceuticals.

OCB Media has won seven national awards for the quality of its medical e-learning materials, including three from the British Medical Association alone.

Find out more: www.ocbmedia.com

Spectral-ID Ltd

Spectral-ID is a low cost method of non-destructively detecting counterfeit products. The Spectral-ID hand-held device can be used throughout the supply chain to discriminate rapidly between genuine and counterfeit product samples or alert the user to the need for more comprehensive laboratory analysis of a suspect sample.

Spectral-ID has successfully been used to authenticate counterfeit medicines and other high value goods such as razor blades, spirits and batteries.

The device has also been used to support Art History projects in collaboration with English Heritage by analysing fragments from a pre-reformation burial tomb in Framlingham, Suffolk. The analysed fragments were then modelled using 3D visualisation software and pieced together to re-form the tomb.

Find out more: www2.le.ac.uk/projects/space-ideas-hub/services/tech/spectral-ID
Cancer Diagnostics

The School of Medicine is a leading centre for cancer research. Cancer Diagnostics is a collaborative research project based on this expertise. Recent research has demonstrated that DNA from cancer cells can be reliably extracted from blood samples, and collaboration with the Medical Research Council’s Toxicology Unit has now allowed the analysis of mutations in this DNA. Cancer Diagnostics offers a testing service on a trial basis to oncologists and pharmaceutical companies and charities such as Hope Against Cancer.

The technology is also used to assess the effectiveness of treatment on follow-up. Surgery, chemotherapy and other therapies may eliminate enough of the cancer cells for there to be no remission or they may not. Distinguishing these two groups is vital to ensure that the right patients are given further treatment.

Another use for the technology is to identify the particular mutations in the cancer before treatment, showing how aggressive the cancer is and which treatments may be most appropriate. For example, cancers with genes encouraging metastases are much more serious. Breast and prostate cancers may be hormone-sensitive or insensitive, and treatment is varied accordingly. This analysis could help pharmaceutical companies to develop personalised treatments for cancers.

Find out more: www.cancerdiagnostics.org