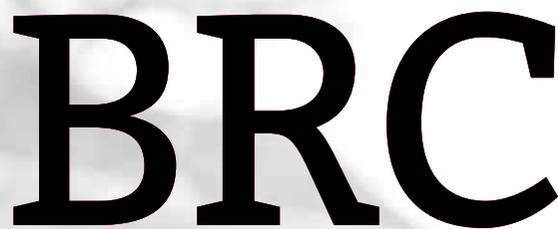


The logo for Bournemouth University, consisting of the letters 'BU' in a stylized, bold, sans-serif font. The 'U' is composed of two parallel lines.

Bournemouth  
University

The logo for Bournemouth Research Chronicle, consisting of the letters 'BRC' in a large, bold, serif font.

Bournemouth Research Chronicle

Edition 5 | March 2016



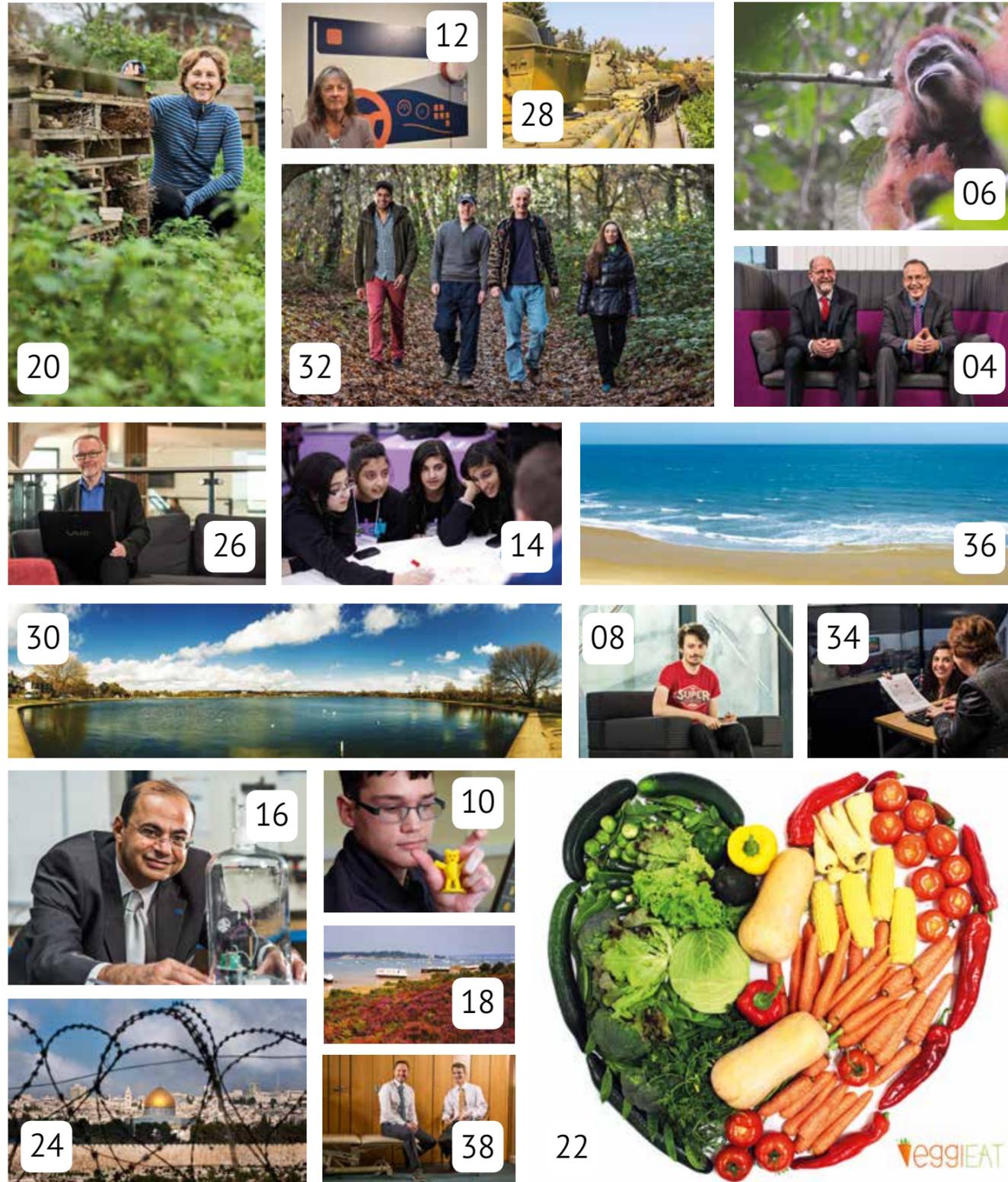
## **Featured stories:**

**Developing sustainable food cities**

**Improving orthopaedic  
practice and patient care**

**Investigating our  
native woodlands**

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## Welcome to the Bournemouth Research Chronicle

The issues facing our society and the world are becoming increasingly complex, requiring solutions that work across disciplines, taking the best thinking and knowledge from a range of subject areas. Here at BU, we encourage our academics to break down barriers and take an interdisciplinary approach to their research, as we believe that by working together we can create the most innovative ideas and solutions. This year's Bournemouth Research Chronicle (BRC) is a celebration of our interdisciplinary research and we are delighted to introduce you to just a small selection of exciting projects.

By connecting experts in different fields, we collaborate on interdisciplinary research, the aim of which is to develop novel approaches and innovative schools of thought that can be applied to complex problems. By taking a holistic view of an issue, more rounded solutions can be developed than would have been possible if a societal challenge was examined through the lens of just one discipline. Of course, we still need researchers to work solely within their discipline; to push the boundaries of their subject and develop new areas of knowledge to create the building blocks for future interdisciplinary research.

The new perspectives developed through interdisciplinary research not only help to give a better understanding of some of the complex problems facing our society, but also help to inform both the teaching and professional practice undertaken by our academics. Our blend of teaching, research and professional practice is at the heart of our Fusion strategy which underpins our work and culture at BU. Introducing different disciplines to our teaching helps to give our students a richer understanding of the world and their subject areas.

We encourage an interdisciplinary approach through our research institutes and centres, where academics from different disciplines and faculties come together to work on various research challenges – sharing ideas and knowledge to develop new theories and solutions.

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“By taking a holistic view of an issue, more rounded solutions can be developed than would have been possible if a societal challenge was examined through the lens of just one discipline.”

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Our Research Knowledge Exchange Office (RKEO) also runs sandpit sessions, which are day-long workshops where researchers from across the university discuss a particular societal problem and use their collective knowledge to come up with potential research projects. One of our recent sandpit sessions tackled the issue of falls in older people, which is a growing challenge for both the NHS and social care. While it is still

early days, we are looking forward to seeing what comes of that session and the new partnerships that emerge from it.

Research Councils UK (RCUK) recognises the importance of cross-disciplinary working and has identified a number of areas where we – as a country – need to be encouraging the development of more interdisciplinary research. From global security to living with environmental change and lifelong health and wellbeing, the topics they have chosen are huge challenges, not just for research, but for us as a society, as a country and in many cases globally. In this year's BRC, we are exploring how our academics and BU research are contributing to a better understanding of and solutions to some of the biggest questions facing our society. We invite you to delve in and discover more about our fascinating research.

**Vice-Chancellor Professor John Vinney and Pro Vice-Chancellor for Research and Innovation Professor John Fletcher**



## STUDENT ENGAGEMENT WITH RESEARCH

Research and teaching are at the heart of BU's mission and by engaging our undergraduates with research, we encourage them to think outside of their discipline and develop skills to benefit their future careers.

# STUDENT ENGAGEMENT WITH RESEARCH

## Can you tell the story of your research in a single image?

That's the challenge we set BU's academics and students, and the overwhelming response saw researchers from all across the university downing tools to take up their cameras and think of unusual ways to illustrate their research. The resulting images demonstrate not just the creativity of our academics and students but also the exciting range of research taking place at BU.

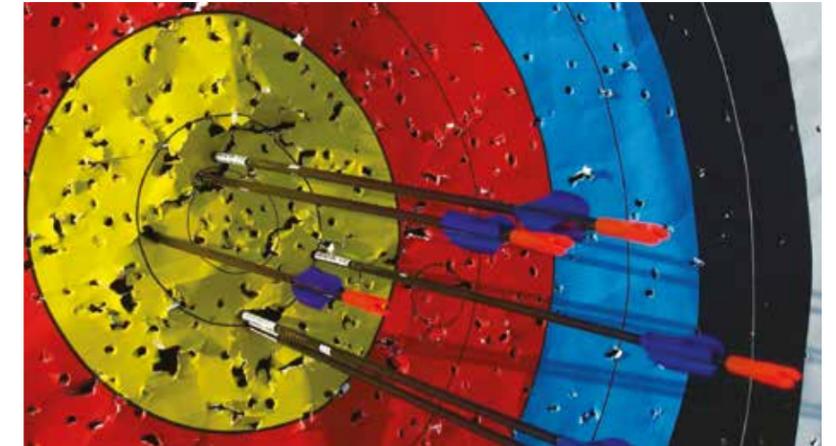
Our Research Photography Competition forms part of our student engagement with research programme which is designed to encourage students to think outside their discipline and learn more about the research going on at BU. The following images are a small selection of entries to the competition and give a glimpse into the world of BU's research.



**All you need is Ubuntu! A case study approach to kinship care in Zululand, South Africa**  
Jill Davey, Faculty of Health & Social Sciences



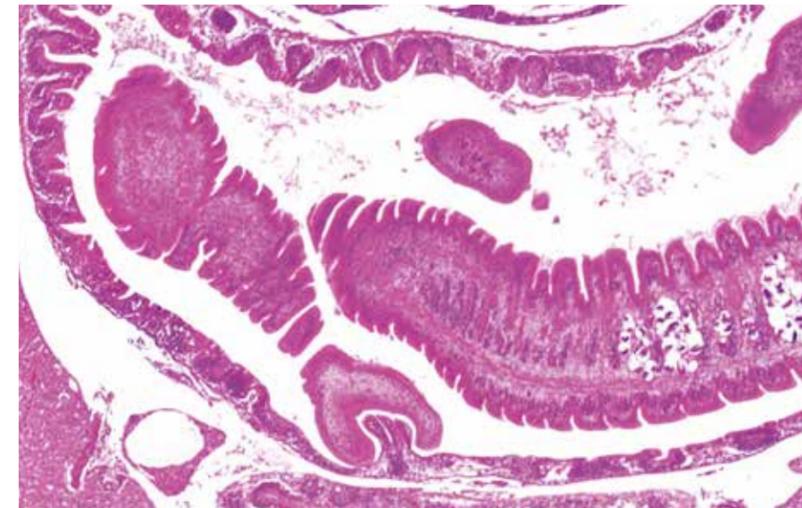
**The Hulks of Holes Bay**  
Paris Iliopoulos, Faculty of Science & Technology



**Marksmanship Analysis Methods**  
Dr Andrew Callaway & Shelley Broomfield, Faculty of Management



**What can eye movements tell us about reading, writing, and dyslexia?** Julie Kirkby, Faculty of Science & Technology



**Bothriocephalus acheilognathi**  
Josie Pegg, Faculty of Science & Technology



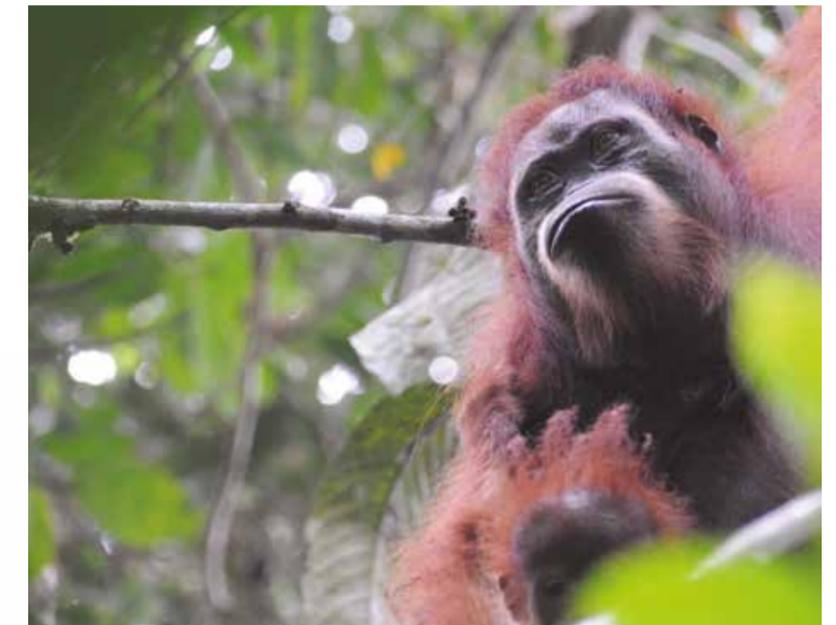
**Printing The Future: The Intellectual Property Implications of 3D Printing**  
Dinusha Mendis, Faculty of Media & Communication



**The Life-Story of a Fish? Answers on a Scale, Please!** Georgina Busst, Faculty of Science & Technology



**Research Takes the Lead!**  
Bruce Grant-Braham, Faculty of Management



**LEAP: Landscape Ecology and Primatology**  
Amanda H. Korstjens & Ross A. Hill, Faculty of Science & Technology



**Steps to Independent Living in Old Age**  
James Gavin, Faculty of Management

# STUDENT ENGAGEMENT WITH RESEARCH

## Supporting undergraduate research at Bournemouth University



Jozef Kulik, Master's student

**W**e think it's really important to engage our undergraduate students with research. It is a great way of enabling them to find out what's happening in other areas of the university and encouraging them to think beyond their discipline. We also provide opportunities for our students to get involved in research, which helps to develop their skills and encourages them to think about future career possibilities.

Our SURE BU conference (Showcasing Undergraduate Research Excellence at BU) and Undergraduate Research Assistantships (URAs) are just two of the ways that we support our students to get involved in research. SURE BU is an opportunity for undergraduates to present their own research at a BU undergraduate academic conference and demonstrate the richness of work being undertaken at BU. The URA scheme gives students the chance to undertake paid work as part of a specific research project under the guidance of an experienced academic, which enables them to learn more about research and develop new skills.

The overall winner of last year's SURE BU conference was Jozef Kulik, who presented a research project about facial disfigurement and examined how disfigured faces are processed by the typical population, at a neural level. He is now undertaking a Master's programme alongside Dr. Ellen Siess and developing a project that focuses on obsessive

compulsive disorder (OCD). They are examining how those with sub-clinical OCD symptoms potentially deviate from the typical population with regards to both their behavioural and neural responses when faced with decisions as part of a gambling task.

Jozef's initial interest in research stemmed from getting involved in research projects undertaken by academics at BU as a means of increasing his understanding of psychology: "I hoped to increase my understanding of the processes involved in psychological and neuropsychological research," he explains. "But as I progressed and succeeded academically I found myself more excited by the prospect of continuing research and the potential to make a difference within a particular field."

Jozef submitted his work to the SURE BU conference at the prompting of his supervisor at the time – Dr Angela Gosling – who suggested it would be a good way of increasing his academic profile and an

excellent chance to learn how to present and develop a poster for an academic conference. Having his work reviewed by professionals other than his supervisor gave him a real confidence boost and, having won the prize for best overall contribution, he was able to continue to develop his passion for research by undertaking an MSc in Clinical & Developmental Neuropsychology at BU.

Speaking about his experience of taking part in SURE BU, Jozef says: "It was one of a number of experiences that made me realise just how much I enjoyed my academic work, which has spurred me on to pursue a research-based career. While I complete my MSc, I'm also applying for PhD programmes in a variety of fields."

BU also supports students to take part in research through opportunities such as our URA programme, where students work alongside academics on a specific research project. BU student Kieran Yon worked with sports lecturers Dr Andrew Callaway

and Shelley Broomfield to collect data that was used to provide tactical information to England Beach Soccer. This helped to identify different goal scoring styles. He also explored different performance results in para-kayaking helping to identify whether there was fairness in the current Olympic scoring system.

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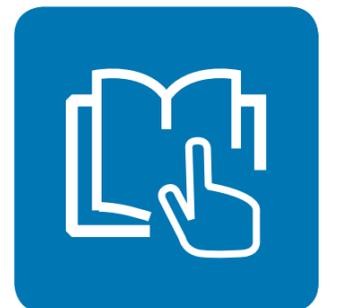
"As I progressed and succeeded academically I found myself more excited by the prospect of continuing research and the potential to make a difference within a particular field."

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"This programme has enhanced my student experience as I came into contact with and got to learn from top sporting professionals on a regular basis. It also provided a great deal of experience in working in the sporting industry, especially the sports performance analysis field, which is beneficial for my

third-year placement and future career prospects," explains Kieran.

"The assistantship has definitely increased my interest in the field of sport research," continued Kieran. "It has led me to consider applying for potential assistantships in future, and completing a Master's in the field of sport upon completion of my undergraduate studies."





## DIGITAL ECONOMY

The digital economy makes a significant contribution to the UK's economy and research can help to unlock the benefits of technology for us all. Research at BU is exploring how technology can lead to improvements in education as well as helping to keep mobile workers in touch with their families.

# DIGITAL ECONOMY

## the SHIVA project – using geometric modelling research to give a creative outlet to disabled children

The digital economy makes a significant contribution to the overall UK economy, and the rapid advance of technology means that research in this area to unlock its benefits for all sections of society is important. A group from Bournemouth University's National Centre for Computer Animation (NCCA) have applied their technical knowledge and expertise to the area of education, which has led to some fantastic results for young people at the local Victoria Education Centre. The impact of the SHIVA project was recognised through a 2015 *Times Higher Education* Award for Outstanding Digital Innovation in Teaching or Research.

Artistic activities are an important educational and therapeutic tool, but people with disabilities, who have little or no limb control, can find it difficult to engage using conventional methods, unable to access tools to express their creativity and imagination. A team from NCCA have adapted their research to develop a software system that enables disabled students to bring art to life.

They have worked with Victoria Education Centre – a local school for children with physical and learning disabilities – on the SHIVA project (Sculpture for Healthcare: Interaction and Virtual Art in 3D), enabling the students to create and 3D print complex objects. The project combines technology and software developed by the team with simple artistic commands and controls allowing the children to create shapes including teddy bears, buildings and Christmas decorations.

"When the project started it was just an idea to make something in 3D for these children,"

explains BU's Professor of Computer Animation Alexander Pasko, who has led on the project. "But then we thought let's add 3D printing to it so they can produce something tangible. So we took our approach to modelling and made the rendering very fast so that children could modify the sculpture or figurine and produce them in real-time."

With no suitable existing virtual sculpting software the team worked with the school to accommodate the various needs and abilities of the different users.

"Creating the interface for SHIVA was the difficult part," Professor Pasko adds. "Each child had to have their own interface - some of them can only touch the screen, some can only use their eyes and so on - and so it has to be reconfigurable per person."

A number of prototypes were developed in conjunction with the school, resulting in a 'totem-pole' sculpting system; the user stacks objects together and performs simple modelling



operations to create and transform shapes. Their model is then 3D printed, giving the children a tangible output for their creativity.

It has been used by 15 students; including two who use eye gaze technology. One student who began by creating random objects can now make identifiable models, such as a teddy-bear. By applying their technical expertise to a different discipline – that of education – the team have brought significant benefits to the young people and teachers at Victoria College.

"The children who participated have changed their perspectives about what they can and can't do", says Professor Pasko, adding that the SHIVA software has been used by teachers and therapists at the school in learning and art-based activities, as well as improving manual dexterity and cognitive development.

The team now plans to work with a small start-up company to develop and commercialise the SHIVA software, which was supported by EU Interreg program funding, and includes partners from France and Norway.

"We think we need to develop this further to install it in several schools for children with special needs and collect more statistically significant data," says Professor Pasko.

The SHIVA project is the latest strand in years of research and activity conducted by the team to improve and enhance geometric modelling in virtual environments.

They have developed mathematical equations that allow more complex and naturalistic virtual modelling, enabling many unusual operations including smooth transitions between the shapes and interiors of objects.

"The current dominating idea is that you model the surface, maybe you paint it somehow with textures and so on, but it's still empty inside," explains Professor Pasko. "If you take a computer game, for example, and you chop an object with a sword, using the current approach you see that empty space – but with our approach you would be able to see everything inside."

**"The children who participated have changed their perspectives about what they can and can't do."**

Such approaches have become increasingly important as technology rapidly develops and multi-material and 3D printing becomes more accessible. The team's techniques and

equations can potentially be used to model and 3D print both natural and complex artificial objects ranging from medical parts to customised jewellery. The advent of 3D printing technology may also influence more traditional animation techniques, such as creating and animating models in stop-motion.

Dr Valery Adzhiev, Senior Research Lecturer, says: "Before they used to shoot the animation using models handmade from Plasticine or similar materials, which was quite labour-intensive and time-consuming, now computers can produce and 3D print these characters with small differences and unlimited preciseness. With our approach, it's more natural looking because it gives the model everything that they would have in real-life."

Following the success of the project and their recent Times Higher Education Award, the team hope that their work in equations and modelling will continue to make a tangible difference to children and industry for years to come.

McLoughlin, L., Fryazinov, O., Moseley, M., Sanchez, M., Adzhiev, V., Comminos, P. and Pasko, A., (2016) Virtual sculpting and 3D printing for young people with disabilities.



## DIGITAL ECONOMY

# Maintaining family rituals when working away from home

The way we work is fundamentally changing, with a rise in mobile working – people who travel away from home for long or short periods of time. Some people, such as lorry drivers, may be away from home as part of their normal working life, while other workers may have occupations that require them to travel and represent their organisation regionally, nationally or even internationally. For mobile workers and their families, this kind of travel can have consequences for daily family life. Alongside an interdisciplinary research team, made up of academics from across the UK, BU's Professor Adele Ladkin has investigated the consequences of mobile working and what it means for family life.



Family Rituals 2.0 is an interdisciplinary research project, drawing on expertise from a number of universities across the UK. The project considered work-life balance for mobile workers and their families, in the context of our digital age. It stemmed from the researchers' interest in discovering how being away from home affects people's ability to participate in family activities – or rituals. Family rituals could be celebrations such as birthdays or anniversaries, or simply day-to-day activities such as reading bedtime stories to children. These are the kinds of things that a mobile worker might miss out on while away from home and technology could enable families to continue to enjoy their meaningful family activities even when they're not together.

There were three stages to the project; the first involved interviews with Human Resource Managers from organisations that employ mobile workers. The second stage was talking to the mobile workers themselves and their families, and the third stage of the project was design-led ethnographic research with five families. In this final stage, the designers and computer scientists designed a prototype technology, which lived with the family as a mechanism to explore the consequences of

the absence of a family member and how to maintain important family rituals.

Professor Ladkin's involvement in the project came about because of her expertise in tourism employment. Business travel is an important sector, and many employees in tourism are routinely mobile due to the nature of their jobs, for example in the case of airline personnel, tour guides and cruise ship workers.

"I think the one thing we look at a lot in tourism is the idea of employees' health, wellbeing and the work-life balance. It is widely recognised that tourism work can involve long hours, and can involve travel away from home, so an understanding of people's working environments and how that might impact on their wellbeing has been helpful in this project," says Professor Ladkin. "My research experience in qualitative data collection and analysis through interviews and diaries also came in useful for this project."

The team working on the project consisted of sociologists, computer scientists and designers. They came from the University of

the West of England, Newcastle University, The Royal College of Art, and Bournemouth University. Between them, the team had a wide range of experience and knowledge, which benefitted everyone, but also presented its challenges at times.

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"Our findings to date have centred around understanding what it means to be absent from family during the course of work, how technology can mediate absence, and what organisations might consider to facilitate the work-life balance of mobile workers."

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"Sometimes it was a challenge to understand our different approaches," says Professor Ladkin. "For example a designer works in a different way to how I, as a social scientist, would work and both are different again to the way a computer scientist works. We have very different terminology, so we had to work out what each other meant!"

The research results showed that employers were aware of the importance of work-life balance for their employees and had policies in place to support this within their organisations. However, the research also showed that there was a gap in HR policies for managing the work-life balance of mobile workers.

"There were no separate HR guidelines to address the different issues that people who are travelling may encounter, such as physical travel fatigue or managing absence from home and the workplace," says Professor Ladkin. "There was a degree of awareness of some of the potential issues but no specific mechanisms in place to help support the work-life balance of mobile workers."

Through interviews with the mobile workers and their families, the team learned about the importance of connecting to home and the implications of this for fostering work-life balance.

"Our findings to date have centred around understanding what it means to be absent from family during the course of work, how technology can mediate absence, and what organisations might consider to facilitate the work-life balance of mobile workers," explains Professor Ladkin. "We are particularly keen to take our findings back to organisations who may be seeing a growth in their numbers of mobile workers."

"We feel there is more work to be done and will be seeking further funding to help continue the research," continues Professor Ladkin. "We were quite ambitious with our aims and it would be really beneficial to have more time to research this issue."

The research was presented as part of the London Design Festival in September 2015 and it was also on display at the Science Gallery in Dublin for the 'Homesick' exhibition about technology and communication.

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Further information on the project can be found at <http://familyrituals2-0.org.uk/>

Outputs will be published in due course.

The team would like to acknowledge the support of the Engineering and Physical Sciences Research Council as funders of this research.



## DIGITAL ECONOMY

### Enhancing education through technological innovation



The advent of affordable and easily accessible technological devices – including smart phones and tablets – initially divided the education system. Should teachers see them as a distraction and ban their use in class, or utilise them as a learning tool?

BU's Professor of New Media Environments Stephen Heppell is a leading advocate for embracing technology, and its potential learning opportunities, in the classroom. By adapting educational practices to benefit from technological advances, Professor Heppell has demonstrated how students' education can be enriched by knowledge from other disciplines.

"One simple example would be the way in which children carrying phones with cameras has enabled schools to create writeable walls and desks that allow children to show, share, exhibit and learn from each others' work - before capturing it with their cameras," Professor Heppell explains.

"Everyone can see clearly what is happening, what is good, what needs help – and those camera phone images recapture 'the moment' far better than a copied piece of work in an exercise book can do. As a result, learning is better, work is faster, sharing raises standards, teachers can intervene quicker and students are hugely engaged."

Yet it's not just the available technology that is important, but the way in which it is used and embraced by educational establishments.

"Just as with pencils and paper, it is what you do with technology that counts. It is not just about equipment, ever," says Professor Heppell, who has been researching the subject for the past 35 years.

"I often get asked what the top three things are to make learning better and the answer is always that there are hundreds of things, small details, none of them hard to grasp in their own right, but hugely complex when considered as a whole."

Professor Heppell adds that learners themselves need to be a vital part of the research process to enable and encourage improvements to education that will really make a difference.

"The learners' research and their voices, however young, should be at the heart of all this," he says. "By and large the current education system is very unambitious for children and as a result they get bored,

unstretched and disengaged," he says. "That is a tragedy but we can turn it around very quickly if we do the right things early enough."

One of his current projects is exploring the ideal food for children to eat before an exam.

"With 900 million children doing tests every year around the world, it is scandalous that this work hasn't been done," he says. "Every athlete knows exactly what to eat before their final event. Kids should know that too, and there is a lot more they should be told as well."

The worlds of technology and education continue to merge and Professor Heppell's knowledge and experience of both is helping make a difference to education policy and procedure on a national scale. He was asked by the government to chair the independent Education Technology Advisory Group (ETAG), leading on the publication

of a report which outlined how digital technology might empower teachers and learners across all aspects of the education system. It concluded that the use of digital technology belongs at the heart of the education process to inspire, create and engage at all stages of learning.

Professor Heppell says: "I was asked to look at what technology could do to help promote innovation in learning, to accelerate learning whilst making it deeper, and to make sure it was still fun for the learners!"

"Our task now is to nag everyone from Vice-Chancellors to Ofsted to make them show the progress they are making in the light of the report. It is fair to say that not everyone is making equal progress."

In addition to having a national impact, Professor Heppell's research and expertise sees him travelling the world – he is currently feeding back to governments in Australia, Finland and China, among others.

But another ongoing research project is taking place closer to home. As patron of the Isle of Portland Aldridge Community Academy (IPACA), he has been instrumental in establishing innovative use of technology and space within the school – including Stage not Age classes and a Use My Own Device policy.

"Just as with pencils and paper, it is what you do with technology that counts. It is not just about equipment, ever."

He is also part of a team from BU's Centre for Excellence in Media Practice (CEMP) commissioned by Samsung to deliver a knowledge exchange project at the school, exploring the impact of a Digital Classroom. Their research will examine the use of digital learning technology in enhancing empowerment, engagement and inclusion for IPACA's local community groups and pupils with special educational needs. By using their digital expertise, the team are demonstrating how knowledge from one subject area can benefit education and learning, proving the value of working across disciplines.

"Obviously this kind of significant re-invention of education, and the remarkable progress associated with it, needs careful documentation and plenty of research," Professor Heppell says. "You only get one chance at being a kid, so we want the very best for them from the moment we know what is working already."

"All this is complex, and hard work, but so very worthwhile."

For more details about Professor Heppell's research and to read ETAG's report, visit <http://etag.report>. ETAG was set up by Ministers from the Department for Education and the Department for Business, Innovation and Skills to advise on how digital technology can empower and benefit teachers and students.



## ENERGY

Meeting our future energy needs poses a significant challenge and is an area where research can make a real difference. BU's academics are very involved in providing solutions – from working with industry to developing reliable sources of renewable energy to exploring its sustainability.

# ENERGY

## Developing reliable renewable energy sources

As the world's population continues to grow, so does our consumption of natural resources. Many of these resources are non-renewable, so research into renewable sources of energy is vital. Research led by BU's Dr Zulficar Khan is tackling this issue through reducing corrosion, improving heat transfer and fluid dynamics, and using nano coatings to enhance surface efficiencies in renewable energy systems.

The European Union's (EU's) Renewable Energy Directive states that the EU should be producing 20% of its energy from renewable sources by 2020; a challenging target for any country. Dr Khan's research is a direct response to this initiative and to the challenge of finding sustainable and renewable ways of meeting our future energy needs. His research is supported by a team of PhD students, many of whom are part funded by industry.

One of his major areas of focus is developing solar thermal technology, which is available abundantly due to its nature. "Currently, we are very reliant on Solar Photovoltaic for our solar panels, but we do not have a large supply of the materials used, so using it won't be sustainable over a long period," explains Dr Khan. "I am developing a means of using readily available and sustainable materials in solar panels, which will help our future energy use. I am also looking at ways to move away from standalone panels to integrating them within standard building practices."

Dr Khan explains the different components in the system: "There are four parts to this system. One part focuses upon generating heat for colder climates, while within warmer climates it focuses on generating electricity. The third part of the project looks at thermo-fluids, with the aim of improving the efficiency of fluids within the solar energy system. The final part will be the integration of heat recovery system from waste."

At the moment Dr Khan and his team of three PhD students are testing the system for generating electricity in warmer climates. Funding from Future Energy Source Ltd. has allowed Dr Khan and his team to set up labs in Poole, which include a scale model of the solar thermal system – an invaluable tool for testing. The first phase of heat generation in cold climates is nearly at the point of being commissioned, while the third phase of testing thermo-fluids will begin in early 2016.

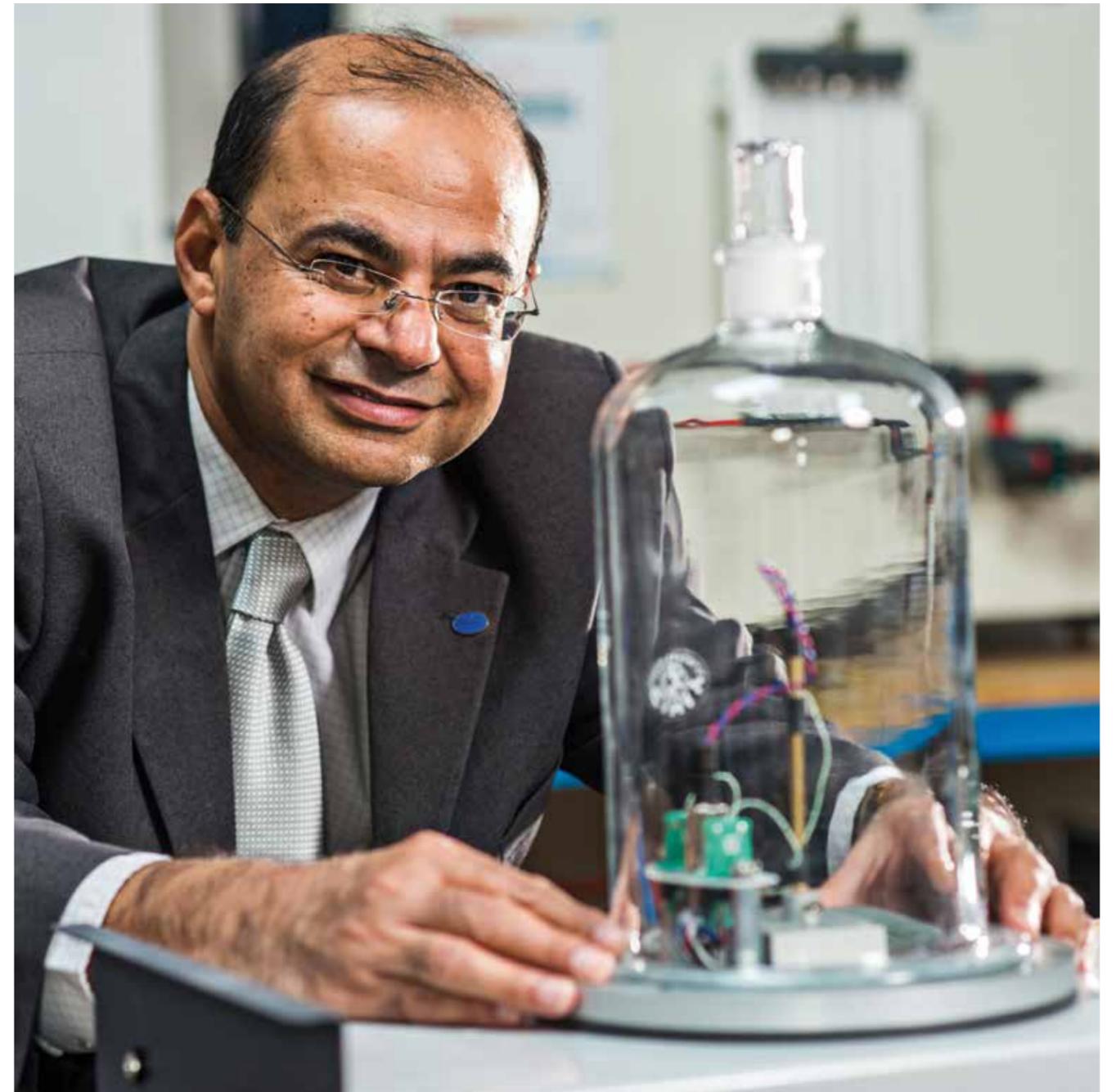
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"I am developing a means of using readily available and sustainable materials in solar panels, which will help our future energy use."

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The very nature of the programme and its complexity means that an interdisciplinary approach is vital. Dr Khan's research combines materials sciences, nano coatings within the field of surface engineering, heat and fluids within heat transfer and thermodynamics, and storage and corrosion engineering.

"It is the combination of several subjects and disciplines which guarantees the delivery of objectives of this very challenging and exciting programme, which will put BU in particular and the UK in general on the international map as a leader in developing clean energy technologies," says Dr Khan. "This is why we shouldn't shy away



from other disciplines as it can bring huge benefits and opportunities to research which will give it originality, significance and reach."

The research and its interdisciplinary nature has the potential to make a significant difference to society as it presents a solution to one of the biggest challenges now facing us – how to meet our current and future energy needs.

"I think we can learn to do without many things, but without energy, life as we know it would not be the same," says Dr Khan. "With our current levels of consumption and the non-renewable sources we are using, our energy sources won't last forever. If we look to the future, our energy reserves used at our current rates will last us perhaps another 50 – 60 years for oil and gas, and coal another 100 years. What are we going to do when that runs out?"

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Helvaci, H.U. and Khan, Z.A., (2015) Mathematical modelling and simulation of multiphase flow in a flat plate solar energy collector. *Energy Conversion and Management*, 106, 139-150.

The team would like to thank Future Energy Source Ltd. for providing funding and resources to enable their research to take place.

# ENERGY

## harnessing marine renewable energy from Poole Harbour

Our future energy needs pose a huge challenge not just for future generations, but for us now. With fossil fuels gradually being depleted and questions arising about the safety of nuclear energy, following the disaster in Fukushima in 2011, the issue of renewable energy has never been so pertinent. But what are the questions we should be asking about the sustainability of renewable energy? For the last few years, BU's Tilak Ginige, a Senior Lecturer in Environmental Law, and Frazer Ball, a Senior Lecturer in Accounting, have been working together to explore renewable energy from the perspective of environmental law, ecology and economics, with fascinating results.



Their research originally stemmed from an investigation into the viability of the Severn Barrage project back in 2009 and subsequent research looking into the viability of developing further nuclear power plants through exploring a case study of Hinkley Point plant. In both instances, Frazer and Tilak applied a novel, interdisciplinary approach to the issue, taking into account environmental law, ecology and economics. This gave them a rich body of knowledge to draw on and ensured that their results demonstrated a holistic approach to an extremely complex set of issues.

In the case of the Severn Barrage, they questioned whether it was sustainable from an ecological perspective, as it had the potential to destroy protected areas of wetland, which would have significantly altered the marine ecosystem. For Hinkley Point, they questioned whether the costs of decommissioning and waste disposal had really been taken into account, or whether

they were simply being passed on to future generations, along with a number of other environmental concerns.

In both instances, they involved BU students extensively in their research as this extended their research capacity and gave students an excellent opportunity to develop their skills. This has been enormously beneficial to their students, as many have used it as a launching point to begin research careers of their own, something which both Frazer and Tilak are particularly delighted by.

As a result of their research into both the Severn Barrage and Hinkley Point, Tilak and Frazer were approached by Dr Zulfiqar Khan, of BU's Faculty of Science & Technology, and Karen Thompson, Project Management Lecturer in the Faculty of Management, who were working with Poole Borough Council on a project around the use of renewable energy in Poole Harbour. Dr Khan was exploring the technical aspects of the

project and Karen Thompson was involved in project management, but given the potential legal, economic and ecological consequences of developing renewable energy in a conservation area, additional expert opinion was sought.

"When we joined the project, they were considering a method of renewable energy called 'water source heat pumps', which works by a heat pump pushing fluid through a network of pipes, absorbing heat from the surrounding water as it moves," explains Tilak. "It's a great, self-sustaining system, but can only really be used over short distances so they were looking at how it could be introduced to supply areas such as Rockley Park."

"We've got to reach certain renewable energy targets set by the European Union," Frazer continues. "And as an island, we're uniquely placed to develop renewable energy sources based on tide and wind, so

Poole Harbour is a great place to explore the viability of some of these projects, but we have to look holistically and take into account the legal, economic and ecological issues that go alongside it. Our previous research collaborations put us in a unique position to do that."

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**They involved BU students extensively in their research as this extended their research capacity and gave students an excellent opportunity to develop their skills.**

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Through working with ecologists and a town and country planner, Frazer and Tilak took an interdisciplinary approach to ensure that they explored every possible variable for the project. As their past work showed them, it is vital to take into account all angles to

prevent hidden costs or legal issues from arising further down the line.

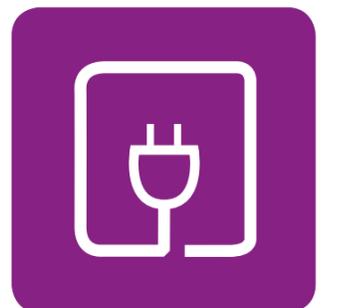
As Frazer says: "We have to take into account the impact on the local area, the environment and the economy. Are these projects going to create jobs? Will they lead to unemployment? Will it affect road usage? It's really important to take these issues into account before a project starts."

The results of their research showed that the Poole Harbour initiative is potentially a very innovative and successful means of providing power to homes and businesses on a small scale. In this particular case, it raised issues around how to protect areas of biodiversity within the harbour, but this was not seen as a barrier to the success of the project – rather an issue to be considered and resolved before it got underway. Thanks to the holistic research and problem solving approach taken by Frazer and Tilak, a trial of this project is now being scoped out, with

the possibility of rolling the scheme out further if it proves successful.

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Ginige, T., Ball, F., Butters, J., Caine, C., Julius, S. and Peace, D (2013) Harnessing marine renewable energy from Poole Harbour: a case study. *Int. J. Liability and Scientific Enquiry*, 6 (No: 1/2/3), 1-26





## GLOBAL FOOD SECURITY

From the very visible issue of malnutrition, to rising food prices, food waste and the provision of a balanced diet, global food security is a challenge for us all. BU's researchers are exploring ways to encourage local food growth and promote healthier eating.

# GLOBAL FOOD SECURITY

## Developing sustainable food cities

The issue of global food security is a problem for us now, and for future generations. Perhaps the most visible issue is malnutrition, which affects millions in the developing world and poses a risk to many vulnerable people in the developed world. But the issue of global food security is much broader than the supply of food – it also refers to the challenges of our dependence on globally imported food, rising food prices, food waste and the provision of a nutritious, balanced diet.

Researchers at BU are working in collaboration with Bournemouth and Poole's Sustainable Food City partnership to tackle some of these issues through a new project designed to look at how we can encourage sustainable food and eating practices, particularly through the growth and consumption of local foods.

At the heart of the project is the idea of nutritional wellbeing; a broad concept that incorporates issues such as a balanced diet, trusting the source of food, knowing how to produce healthy meals, and sustainable food production. A multidisciplinary team of researchers at Bournemouth University, funded by the European Commission, is working on the project, contributing expertise in a wide range of areas – from nutrition and sustainable local food, to improving wellbeing. Taking an interdisciplinary approach to the project is really important to the team, as it provides a depth of experience and a level of richness that wouldn't be possible through a single disciplinary approach.

As Dr Juliet Wiseman – a Marie Curie Research Fellow working on the project – explains, the project stemmed from the idea that “the current food system is responsible for most of the food-related ill health that people are experiencing. While we can encourage people to eat healthily, they can't do it if the food production systems don't allow them to. Our project goes beyond

just looking at providing a sustainable, local food system; we also want to improve people's health.

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“The issue we're facing is that there won't be enough food globally to sustain our population,” explains Dr Murphy. “And by developing a new approach and encouraging different behaviour changes, we hope to start developing a culture shift in the way we think about food.”

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“We're hoping to create a culture shift,” continues Dr Wiseman. “We particularly want to encourage people to think about growing their own vegetables and explore the barriers that prevent people from doing that.”

One of the barriers already identified by the team is the lack of fresh food markets in the local area. Where they do exist, they tend to be quite expensive, which presents another difficulty for many people. As the research team have observed, Bournemouth and Poole are still in the very early days of developing a sustainable food model, which is part of the reason it's an exciting location in which to be designing and testing a new model.

By working with existing community projects, the team hopes to find out what people who are currently growing their own food get out of it and how this can be translated elsewhere. They also intend to set up their own project in an area of Poole where no one is currently growing anything, so that they can follow the development of a new initiative from the very beginning.

“We're very much focused on behaviour change,” says Dr Dawn Birch, a Senior Lecturer in Marketing, who has an interest in sustainable local food. “In marketing, we call that social marketing – marketing an idea – that people could be more engaged in growing their vegetables in order to be more conscious of what they're eating and then in turn improve their wellbeing.

“At the moment, if you live in Poole and wanted to shop only for food produced in Dorset, there isn't really a way to do it, which is why we want to focus our efforts on creating a behaviour change around growing your own food. We can't influence the food supply chain, but this is a tangible way we can make a difference.”

Dr Jane Murphy, an Associate Professor in Nutrition, says that by the end of the project they want to “have produced a toolkit that translates this model of local, sustainable food that we develop, so people can use and engage with it elsewhere.”

“The issue we're facing is that there won't be enough food globally to sustain our population,” explains Dr Murphy. “And by developing a new approach and encouraging different behaviour changes, we hope to start developing a culture shift in the way we think about food.”

“It's about educating consumers,” continues Dr Birch. “By showing people there are different ways of approaching food consumption, we hope to change the way things work now. The classic example of this is the 'ugly' vegetable – if consumers accept that vegetables don't have to look perfect, then they will begin to change how they source their food. We want to develop exactly that kind of consumer-led change.”

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For more information, visit NuFEAST's project page: [www.bournemouth.ac.uk/nufeast](http://www.bournemouth.ac.uk/nufeast)

This research project is being made possible thanks to Horizon 2020 funding.





## GLOBAL FOOD SECURITY

### Encouraging healthier eating and balanced diets



From an early age, children are taught about the importance of eating fruit and vegetables, but a quick glance at most nutrition-based news stories will paint a very different picture, a rise of junk food, fast-food consumption and obesity.

Adequate vegetable consumption is fundamental to a healthy balanced diet, however EU compliance with dietary guidelines is poor and there is a notable lack of research in this area.

A collaborative team from Bournemouth University, led by nutrition expert Professor Heather Hartwell, are hoping to change our eating habits, championing vegetable consumption through a Europe-wide research project called VeggiEAT.

The VeggiEAT project aims to promote healthy eating throughout Europe and encourage more vegetable consumption across the lifespan. Professor Hartwell explains: "Within Europe, we don't eat enough fruit and vegetables and there

are a multitude of associated health issues. There's been a lot of individual intervention, such as the five a day campaign, but VeggiEAT is particularly concerned with vegetable consumption by school children and older people."

VeggiEAT aims to develop a European platform for vegetable intake that takes into account consumer behaviour and environment before making recommendations to both governments and vegetable manufacturers and suppliers. These recommendations will involve consumer-oriented products, the development of recipes for use by food providers and benchmarking of choice architecture facilitating the consumption of vegetables.

The project is already making an impact, and has seen engagement from both school children and older members of the community within Dorset. The project even involves current Bournemouth University undergraduate students who are testing dishes that have been designed by Culinary Master's students in France.

"Ultimately we would like to see a change in consumer behaviour that makes vegetable consumption 'the norm' and promotes healthy food consumption across Europe."

Professor Hartwell, a registered nutritionist, actively works within the foodservice industry, and particularly within the public sector such as schools, hospitals and prisons, where she is able to translate her academic efforts into practice. She says: "It's really important that the work done in universities is not isolated from how industry works - we can suggest solutions, but unless they are going to work in a real-life context, they are never going to be useful. That is one of the strengths of this research project - we are working to find real-life solutions that will help people to get the right nutrients in their diet from eating well and, ultimately, lead them to be healthier."

Professor Hartwell and her team hope that VeggiEAT will cause us to make changes to our food habits. Professor Hartwell says: "We hope VeggiEAT will eventually inform government policy across Europe and put the food service industry at the forefront of healthy eating interventions - while also

giving consumers foods they'll enjoy. We want the change to start at an institutional level - through schools, canteens and restaurants - but ultimately we would like to see a change in consumer behaviour that makes vegetable consumption 'the norm' and promotes healthy food consumption across Europe."

The project is made possible with the support of an interdisciplinary team that includes nutritionists, psychologists, consumer behaviour experts, public health experts and the food service industry. Bournemouth University is leading the project, working with the University of Copenhagen in Denmark and the University of Florence in Italy, alongside industry partners Bonduelle and the Institute Paul Bocuse in France.

Professor Hartwell believes that the interdisciplinary nature of the team is another element that gives the research strength. "The multidisciplinary and inter-sectoral approach of the project will create a win-win situation for all partners, as well as generate spill-over effects at European level.

"All partners share a common interest in that they are keen to advance the promotion of healthy eating, in particular vegetable intake. By linking with scientists and industry personnel (both culinary and manufacturer), they offer different perspectives when examining strategies to enhance the health of the EU consumer. The entire value chain is addressed, from the manufacturer (Bonduelle), to recipe development (vehicle of vegetable presentation) up to the end user (the consumer)."

For more information about VeggiEAT, visit their project website: <https://microsites.bournemouth.ac.uk/veggieat/>

Appleton, K, Hemingway, A, Saulais, L, Dinnella, C, Monteleone, E, Depezay, L, Morizet, D, Perez-Cueto, F J A, Bevan, A, Hartwell, H (2016) Increasing vegetable intakes: rationale and systematic review of published interventions, (in press)

VeggiEAT is funded by the European Commission through a Marie Curie Industry and Academia Partnerships and Pathways (IAPP) grant.



## GLOBAL UNCERTAINTIES

With security concerns rarely out of the news, there is a real need for research in this area to address some of the risks facing us. BU's researchers are furthering knowledge by exploring why extremist ideologies appeal and developing an understanding of new concepts such as hybrid war.

# GLOBAL UNCERTAINTIES

## The effects of unrest on people's perception of risk

Global security is fast becoming one of the biggest issues facing us as a society – both at home and abroad. Just a brief glance at newspapers from the last year shows that conflict and security have rarely been out of the headlines. From attacks in Paris to unrest in the Middle East, security issues often dominate the news.

A common theme between these types of events is that they were deliberately targeting tourists or people enjoying leisure time, which can have potentially long-term consequences for tourism and the economies of those countries affected. BU's Associate Professor Dr Yeganeh Morakabati is an expert in the area of risk perception, people's behaviour in relation to risk and particularly how tourism is affected as a consequence of terrorism, conflict and political unrest.

Dr Morakabati grew up during the Iran-Iraq war, which, as she explains, meant her childhood was embedded in war. "I grew up with war and acts of terrorism around me, which of course meant I could not avoid knowing about its consequences. I understand the effects and I know first-hand the fear it creates."

"I originally studied maths in Iran, but came to the UK to do a PhD about the effects of terrorism on tourism, for which I won an external prize – that's how my name was first linked to this area of research. That's where it all started."

Dr Morakabati's experiences of growing up in Iran and her time living in the UK gives her a unique perspective on understanding events, which helps to increase the richness of her research. "My research is partly about bridging a gap between the developed and developing world," she says. "I have seen both sides, and a lot of what I try to do is bringing them together to understand what's happening. I can understand the society and mind-set of both sides; it enables me to understand reactions better."

Through her research into risk perception, and particularly how that affects tourism after a crisis, Dr Morakabati hopes to further our understanding in this area. As she acknowledges, finding a solution is far beyond the control of one person, but by pushing the boundaries of knowledge in this area, she hopes to move us a step closer to a solution.

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"I work with many academics in other faculties in BU, which builds bridges between our different areas of research. The depth in my research comes from working across disciplines."

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"My research is really about understanding what happens as a consequence of a conflict, an attack, a crisis," says Dr Morakabati. "If this thing happens, what can we anticipate will happen next? How can we prepare for that? Rather than solving the problem, it sets up an understanding of what can be done."

Taking an interdisciplinary angle to her research is extremely beneficial in developing an understanding of the area in which she works. As Dr Morakabati explains: "I look at how people behave, when faced with the risk of terrorism, or political unrest and how it impacts on international relations, all through a quantitative approach, which brings in my statistical background. I work with many academics in other faculties in BU, which builds bridges between our different areas of research."



The depth in my research comes from working across disciplines."

As an example of her work, a few years previously, Dr Morakabati worked with other researchers in BU's Centre for Disaster Management on a project funded by the United Nations, looking into emergency planning and how countries react in the event of a natural disaster, conflict or political unrest. This covered both the operational response and the impact of the event – both short and long term. The results of this study will be published shortly.

Other areas of her research have considered the impacts of terrorism on tourism and the long-term effects on the economy and spending patterns. "We try to explore what the effects of terrorism attacks, or unexpected disasters will be," says Dr Morakabati. "How will the impacts play out

in different countries? Does it have the same effect if it's an attack targeted at a transportation system, compared to a beach resort? We want to understand the effects of different variables and what happens when different factors are at play."

Her research and the depth that its interdisciplinary nature provides means that Dr Morakabati has become a frequent commentator in the news when events such as last summer's attack in Tunisia take place. The insights from her research can help provide context and an understanding of what might take place and she hopes that this public platform will enable her to build contacts with policy makers.

"I'm working to make connections in policy, as I believe that's the place where my research can make a real difference," says Dr Morakabati. "Of course, I want to see the

world becoming a more peaceful place, and I hope that my research will help us move towards that."

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Morakabati, Y., Fletcher, J. and Prideaux, B. (2012) Tourism development in a difficult environment: a study of consumer attitudes, travel risk perceptions and the termination of demand. *Tourism Economics*, 18 (5), 953-969.

Morakabati, Y. (2013) Tourism in the Middle East: Conflicts, crises and economic diversification, some critical issues. *International Journal of Tourism Research*, 15 (4), 375-387.



## GLOBAL UNCERTAINTIES

### The appeal of extremist ideologies

Over the course of the last year, there have been a number of high-profile cases of young people leaving the UK and Europe to travel to Syria to support Islamic State. The overall numbers of people involved are difficult to pin down, but as of the end of 2015, it was estimated that around 700 people had left the UK to fight in Iraq or Syria.

The question of why they leave and what it is about those extremist ideologies that appeals is an extremely pertinent one, not just for our national security, but also to protect the lives of young people who are being drawn into conflicts in the Middle East. BU's Professor Barry Richards has been studying this area for many years, starting from an interest in the IRA bombing campaigns from the 1970s to the 1990s.

"I am a political psychologist. My background is in both psychology and sociology, which means I bring an interdisciplinary approach to my research. We might think about this psychosocial approach as a 'binocular' one – two eyes looking at the world from different positions, producing two images which we must synthesise into one in order to get the fullest picture," explains Professor Richards.

"I am particularly interested in the emotional aspects of politics," he says, "especially in relation to extremist politics, fundamentalist politics and political violence. Fieldwork is obviously very difficult to carry out in this area, so my main area of research is looking into the appeal of extremist political ideologies, which I explore through analysing the texts published by extremist groups – whether that's manifestos, websites or magazines.

"These texts give quite a rich picture of what these organisations and their ideologies can offer emotionally to potential recruits," continues Professor Richards. "These substantial bodies of text can be analysed

in order to understand the appeal of these ideologies."

The amount of data that is now available from extremist groups, compared to what was available when Professor Richards first began studying the appeal of extremist ideologies in Northern Ireland, has increased exponentially, thanks to the ease of sharing information over the internet. "I think the way ideas are shared via the internet has really become part of the phenomenon," he says. "We've had extremist ideas since the beginning of politics, but there's something about the internet – the way it's used as a catalyst – that's changed the scale of the problem, although the basic drivers on the psychological side are still very much the same."

"We've had extremist ideas since the beginning of politics, but there's something about the internet – the way it's used as a catalyst – that's changed the scale of the problem, although the basic drivers on the psychological side are still very much the same."

Professor Richards' research doesn't just tackle the issue of why individuals may get drawn into, or become sympathetic towards, extremist ideologies, but also explores how within some environments there are atmospheres of permission or tolerance which allow these ideas to gain credibility. "It's a dual level research question," says Professor Richards. "We need to consider the issue at an individual level and at a subcultural level. We need to consider both when trying to devise interventions to try and stop this from happening. It's harder to do, of course, in a community context, but it is necessary to address the pockets of deep alienation in our political culture that allow individuals to become radicalised."

By taking an approach that explores both the external, political reasons behind the appeal of extremist ideologies, as well as the internal, emotional drivers, Professor Richards is able to get a holistic view of the issue. As he explains, from an internal perspective, "people are often driven by a

sense of humiliation – not necessarily from actual experiences of humiliation, but from acquiring that sense – which can make it easier to identify themselves with groups of people who feel that they are victims.

"Victimhood and humiliation are the main emotional drivers behind the appeal of extremist ideologies, which is coupled with a very fundamentalist view of the world – that everything is either black or white."

While these psychological factors can play out in very different ways, depending on the situation and types of ideologies involved, the underlying factors are essentially the same. "The central appeal of extremism remains the same, regardless of whether the individual concerned is being swayed by a jihadist view of the world or a neo-fascist one," explains Professor Richards. "The idea of tackling the core appeal has now fed into the way that governments are responding to extremism at a national level. The idea of a counter-narrative has become a regular part of the counter-terrorist strategies being used by governments."

Some of Professor Richards' work is described in his chapter 'The voices of extremist violence: what can we hear?' in a recent collection edited by Faculty of Media & Communication colleagues: Thorsen E, Jackson D, Savigny H, & Alexander J, eds. (2015) *Media, Margins and Civic Agency*, Palgrave Macmillan.

Professor Richards was recently awarded funding for a Marie Curie Fellowship, which was given to Dr Lamprini Rori who is developing her research into the area of political extremism in Greece.





## GLOBAL UNCERTAINTIES

### Hybrid war and the conflict between Russia and the Ukraine

Throughout history, conflict has been an ever-present aspect of human activity, but war has of course evolved over the centuries as technology and military strategies changed. The concept of hybrid war has emerged since the end of the Cold War and describes the idea that conflicts are multi-faceted, consisting of strategies that blend conventional warfare tactics, cyberwarfare activities, use mass communication channels to distribute propaganda and often involve a fluid, non-state adversary.

With the nature of conflict irrevocably changed, the importance of research in this area cannot be underestimated, as it can go on to influence policy makers and the way that nations respond to security threats. BU's Dr Sascha-Dominik Bachmann, an Associate Professor in Law, is working with military experts from the Swedish Defence University (SEDU) to explore the concept of hybrid war and advise policy makers about how to deal with the threat. He has been working with Professor Håkan Gunneriusson, Head of Research: Ground Tactical and Operational Matters at SEDU, since 2011 on the subject.

"My area of research is mostly conflict, and specifically hybrid war, which is a particularly topical subject since Russia's activities in Ukraine and the Crimea. I have been working on this since 2011, when I was NATO's Rule of Law Subject Matter Expert on a project looking into how to counter the threat of hybrid war," explains Dr Bachmann.

"My background is in law, so I take a legal approach to my work, whereas my colleagues in Sweden are experts in military studies and therefore look at the issue through a different lens," says Dr Bachmann. "I have a military background myself; I served for 17 years in the German army and took part in three peace keeping operations, while researching my doctorate.

"This is why I take an interdisciplinary approach to my research; that and the fact that I couldn't do research in this area without relying on the expertise of other colleagues. The issues are simply too complex."

"Hybrid war is a new concept and one that is evolving quickly. It's something that governments and policy makers need to know how to respond to, as conventional military strategies don't work."

Dr Bachmann originally became involved in this area of research through his role as Rule of Law Subject Matter expert for the North Atlantic Treaty Organisation's (NATO) study on hybrid threats facing Europe – diverse issues such as terrorism, organized crime, failed states and how a mass influx of migrants might lead to political instability in certain countries. The underlying issues often form the tactics used in hybrid war, which is how one area of research led to another. Hybrid war is an extremely topical issue following Russia's actions in Ukraine, which means that Dr Bachmann often finds himself sharing his research findings with international policy makers as they try to determine how to respond to it.



As he explains: "Hybrid war is a new concept and one that is evolving quickly. It's something that governments and policy makers need to know how to respond to, as conventional military strategies don't work. We need a different legal framework to tackle hybrid war, because it uses the cybersphere for the purpose of disinformation and propaganda as fear-based tactics to achieve its aims. It's a completely different way of waging war and is something that we are only going to see increase."

Lawfare, for example, is a new aspect of hybrid war, and one which has affected the UK in the past. The UK has seen legal challenges to its military activities in Iraq and Afghanistan – an example of how the law can be used as part of a hybrid war strategy in on-going conflict. Communication and propaganda too, can be used to spread false information or sway public opinion, as has been seen in Russia and Ukraine. For

exactly these reasons, Dr Bachmann believes it is vital to have a multi-disciplinary and comprehensive approach to dealing with hybrid war threats.

"No one wants to go to war, of course," he says. "However, in instances such as we have seen in Ukraine, where a threat is made, we must be able to respond – but respond in kind. This could be through adopting lawfare strategies or spreading information proactively through the communication sphere. We have to look at the threat through a different lens and use different methods to deal with it."

"Ultimately, this is an area of research where we – as academics – can make a big difference. It's an area that is moving very fast and requires a quick response from international bodies. As lawyers, we can work with NATO and national ministries of defence to develop new legal frameworks to tackle these issues," explains Dr Bachmann.

"The precedent is there," he continues. "A few years ago cyberwarfare was the big issue, which eventually led to the creation of the Tallinn Manual, which sets out international law in relation to cyberwarfare. Through our research, we hope to contribute to a similar legal framework to tackle hybrid war. That's the aim behind all our research – and it's something that simply wouldn't be possible to achieve without taking an interdisciplinary approach. Such a complex problem can only be dealt with by looking at all the angles."

Bachmann, SD and Gunneriusson, Håkan, (2015) "Russia's Hybrid Warfare in the East: Using the Information Sphere as Integral to Hybrid Warfare" *Georgetown Journal of International Affairs*



## LIVING WITH ENVIRONMENTAL CHANGE

Understanding the consequences of environmental change and learning to adapt our lifestyles accordingly is something that concerns many of us. Researchers at BU are exploring what this means for us locally – in Poole Park and the New Forest – and how we can adjust our behaviour to prevent further environmental problems.

# LIVING WITH ENVIRONMENTAL CHANGE

## How do you solve a problem like Poole Park?

Featuring more than 60 acres of water, historic Poole Park has long been the setting for a plethora of watersports and recreational activities. But its boating lake has experienced issues over recent years, with swarms of midges and large amounts of algae and weed appearing.

A Bournemouth University project is investigating and monitoring the water quality and ecology at the lake to better understand the factors behind the problems and suggest management solutions. The year-long project is being undertaken by Bournemouth University Global Environmental Solutions (BUG) after winning a competitive tender from the Borough of Poole to complete the work.

“What many people don’t realise is that the boating lake originally formed part of Poole Harbour and would have been refreshed with seawater on every tide,” says Adrian Pinder, Head of BUG. “With water exchanges in the harbour now controlled by sluice gates we need to overcome a number of challenges to manage the lake to its best potential.”

He adds: “A combination of factors is driving some real environmental problems – such as dramatic weed growth which starts to rot and smell. Additionally, because it’s freshwater one minute and saltwater the next, there aren’t many animals that can live in that environment. But non-biting midges have done very well to exploit that habitat, and when they hatch you get swarms.”

The BUG project team are completing weekly monitoring exercises in Poole Park boating lake and two smaller freshwater lakes - testing the

water levels, quality and amount of sediment in the lakes. They are also investigating the ecology of the lakes – completing invertebrate and fish surveys both before and after the lake has been flushed with fresh seawater to see what impact it has on the wildlife within.

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“We are applying BU research and expertise in the real world to answer real questions, using our knowledge and experience to actually solve environmental problems and provide solutions.”

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“At times there are a lot of fish in there and at others there are very few, as a lot of them die off when the conditions become unsuitable,” says Adrian. “The idea is to understand how much water exchange is required to compensate for pollutants that are going in and keep the lake itself – and things like its salinity – within a set range of values to promote a more balanced ecosystem. This includes things like predator-prey interactions – so making sure there is something in there that will eat the midges.”

The project began after the Borough of Poole was successful in the first stage bid to receive



a £2.7 million Heritage Lottery Fund for improvements to Poole Park, and the community have been involved and consulted throughout. As well as using scientific research methods, the team are relying on local people to get involved in the research and participate in public engagement activities. Using a variety of different research methods and taking a more collaborative approach to their research is giving a richer understanding of how people engage with the park and the impact of pollution.

Adrian says: “I’ve been leading guided walks around the lake, explaining the project to them and telling people about the issues and what we are doing. We’ve also held public engagement days where people are invited to find out more about the lake – catching fish and taking them for health checks, litter-picking around the lake, and looking at where they could see drain inputs coming in.”

A number of undergraduate and postgraduate BU students have also had the opportunity to participate in the project,

which has provided paid work placements and assistant positions. BUG blends academic and industry expertise to address ecological issues and provide sustainable solutions.

It is hoped that the results of this project will provide insights and management solutions for the Borough of Poole that will enable families to enjoy Poole Park and its water features for years to come.

“We are applying BU research and expertise in the real world to answer real questions, using our knowledge and experience to actually solve environmental problems and provide solutions,” says Adrian.

“The lake has been costing the council money – they have been trying to manage the problems by doing things like getting weed cutters in and investing in barley straw bales to discourage algal growth. There’s considerable investment every year but, so far, none of the initiatives have worked. But if the water quality can be improved, we may be able to do away with all that.”

Possible solutions include dredging the lake and more regular flushing of the water, with an automated sluice.

“At the end of this, we’ll be advising what the options are for the council in terms of managing the lake and trying to mitigate some of the problems they have at the moment,” says Adrian. “Based on the recommendations from our review, they want to try and identify the roots of these problems – rather than putting sticking plasters over them – to try and manage the lake better.”

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For more information about BU Global Environmental Solutions, please visit <https://microsites.bournemouth.ac.uk/business-services/consultancy-and-funding/>

Funding for this project came from the Heritage Lottery Fund via the Borough of Poole.



# LIVING WITH ENVIRONMENTAL CHANGE

## Investigating our native woodlands

Many woodland areas across the world are currently experiencing major dieback and collapse, owing to factors including climate change, grazing livestock, fire, and the spread of pests and diseases. As well as the loss of important ecosystems, the collapse of woodlands also impacts upon the people who visit and enjoy such areas – and the economic benefits that woodlands provide.

A team from Bournemouth University has taken an interdisciplinary approach to studying the New Forest National Park, using historical data to see how its woodland areas have changed over the past 60 years alongside interviewing visitors about their response to such changes.

“Our aim really is to make that connection between a natural environment and human use,” say project lead, and BU’s Professor of Conservation Ecology, Adrian Newton. “So we are looking at the ecology of the system, and how it’s changed over time – particularly in the context of climate change – but also the benefits provided by these ecosystems and the implications of those ecological changes for people.”

The project has used survey data collected in the New Forest over the past 60 years to measure the scale of the changes. The findings have been stark, as Professor Newton explains. “We’ve actually been able to go back and survey these long-term plots and show that the woodlands have changed a lot, as many trees have died over that period – particularly beech trees,” he says. “60 years ago, there were complete and intact beech woods – which are now, in some cases, almost grassland, so many of the trees have died.

“These ancient native woodlands that we have in the New Forest, which are very special in terms of their wildlife value, are also really valued by people, as we have also shown in our research. Yet they are dying on quite a big

scale – and we can see that from these long-term data, and our analysis of woodlands that are currently experiencing dieback.”

The two-year project is part of the Biodiversity and Ecosystem Services for Sustainability (BESS) programme, funded by the UK Natural Environment Research Council (NERC). It aims to increase understanding of how major ecological changes occur in woodlands, and their potential ecological and societal impacts. By combining knowledge of ecological changes, with an understanding of human behaviour, the team hope to use expertise from different subject areas to reach a better understanding of the underlying issue.

Alongside ecological surveys, the team have interviewed visitors to the New Forest to ascertain what they value and enjoy about the area. GPS trackers have also been used to study their movements around the forest.

“The New Forest is a very special place because it’s so important for so many people,” says Arjan Gosal, a PhD student working on the project. “It has something like 13 million day visits a year, so recreational use is something we’ve looked at in depth. We have surveyed what visitors say they like about the forest and have then explored this further by seeing where they go and how they spend their time when they’re here.”

He adds that the woodland areas – and particularly those featuring native species – were especially popular with visitors. “It’s the woodlands and particularly the native woodlands they like best,” he says. “They love having a walk in the woods and they particularly like the broadleaf trees and the larger trees. But it’s exactly these bigger, native, broad-leaf trees that are dying,

so I think we are showing that this is of importance to people.”

Other strands of the project have investigated the knock-on effect of such loss of woodland to the area’s ecosystems – such as plant-life and soil composition – and the impact on the environment.

Team members Dr Elena Cantarello, Dr Philip Martin and Paul Evans have also modelled simulations of how the area is likely to continue to change in the future, accounting for factors like climate change, spread of disease, and grazing animals.

Professor Newton hopes that the project’s findings will be of real use to those who oversee and maintain woodland areas, helping with the implementation of management schemes to minimise loss. “We want to provide evidence that these changes are happening and they have real implications for human society, but we’re also keen to give some actual advice to managers,” he says. “We want to make them aware of what’s happening, but to also give

them some guidance as to what they can do to address the problem. At the moment we are working with the Forestry Commission, who are busy developing a new management plan for parts of the New Forest, and we are hoping that some of our results will help inform that.”

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With climate change being such a huge and complex issue, Professor Newton hopes projects such as this will help to demonstrate, in a clear and tangible way, the impact it is having on our environment. “I think there’s a lot of uncertainty for the general public around climate change and whether it’s really having an effect,” he says. “I think this is a good example where you can show that it really is – we are literally finding hundreds of dead trees in these woodlands where we know that 60 years ago that wasn’t the case.

“So it is changing, and we can document that and raise awareness – but also show that actually it really does matter, because people value these woodlands for their aesthetic value, for recreation and perhaps even for the economy. These ancient native woodlands they’re very special, they’ve been here a long time and they are disappearing. We’re trying to find a way to save them.”

Martin, P.A., Newton, A.C., Cantarello, E. and Evans, P., (2015) Stand dieback and collapse in a temperate forest and its impact on forest structure and biodiversity. *Forest Ecology and Management*, 358, 130-138.

This research was funded by the Natural Environment Research Council (NERC).



## LIFELONG HEALTH AND WELLBEING

Improving our overall health and wellbeing is a key priority for research, particularly as we are living longer. Researchers at BU are exploring how to improve our wellbeing throughout life, as well as responding to health issues that emerge as we age.

# LIFELONG HEALTH AND WELLBEING

## Designing dementia-friendly environments

As the population ages and demography changes, the UK is facing an unprecedented challenge of how to care for and support its older people. While the fact that people are living longer should be celebrated, the flip side is that age-related illnesses such as dementia are on the rise and it's important for us to find solutions and alleviate the difficulties people may face as a result. Under the supervision of Associate Professor Jan Wiener, one of BU's PhD students Mary O'Malley has been exploring the issue of how people with dementia learn to navigate unfamiliar environments and what consequences this could have for dementia care home building guidelines.

"My research is looking at ways to reduce potential spatial disorientation for older adults, both those with memory difficulties and those without," explains Mary. "By exploring this issue, I hope it will lead to design changes in the living environment that supports successful orientation."

"I'm looking at people's wayfinding systems and how navigational tools are used in care homes, and how these might help or hinder people's abilities to find their way around," continues Mary. "I'm looking at the strategies people use to learn new environments and I'm also going into retirement developments and asking people how they find their way around and what helps them to navigate unfamiliar places – for me, it's important to hear the users' voices when it comes to designing the environment."

Mary is undertaking a mixed methods PhD, which is gathering both qualitative and quantitative data. By carrying out a number of studies and drawing on expertise from BU's Psychology Department, BU's Dementia Institute (BUDI) and external architecture expertise, Mary is taking a rounded, interdisciplinary approach

to her work. For her, bridging the gap between disciplines has been very beneficial.

"If you were just approaching this from one angle, one discipline, you'd miss so much valuable information," says Mary. "To be able to improve the design environment, it's really important to get input from different subject areas. There's no singular way of doing this, so it's great to draw on expertise from a spectrum of disciplines."

As she explains: "In psychology, we have a lot of knowledge about wayfinding and how people navigate around environments, but not a lot of that has been translated into applied settings. There's lots of potential to apply and test this knowledge for older people in retirement settings and care homes, both of which are places where this research could make a real impact."

While design guidelines are often applied to care homes, there are lots of other spaces used by older people and people with memory problems which could benefit from better wayfinding guidelines – hospitals, retirement

homes and shopping centres are just a few examples. Given the prominence of the idea of dementia-friendly communities, Mary's research is very timely.

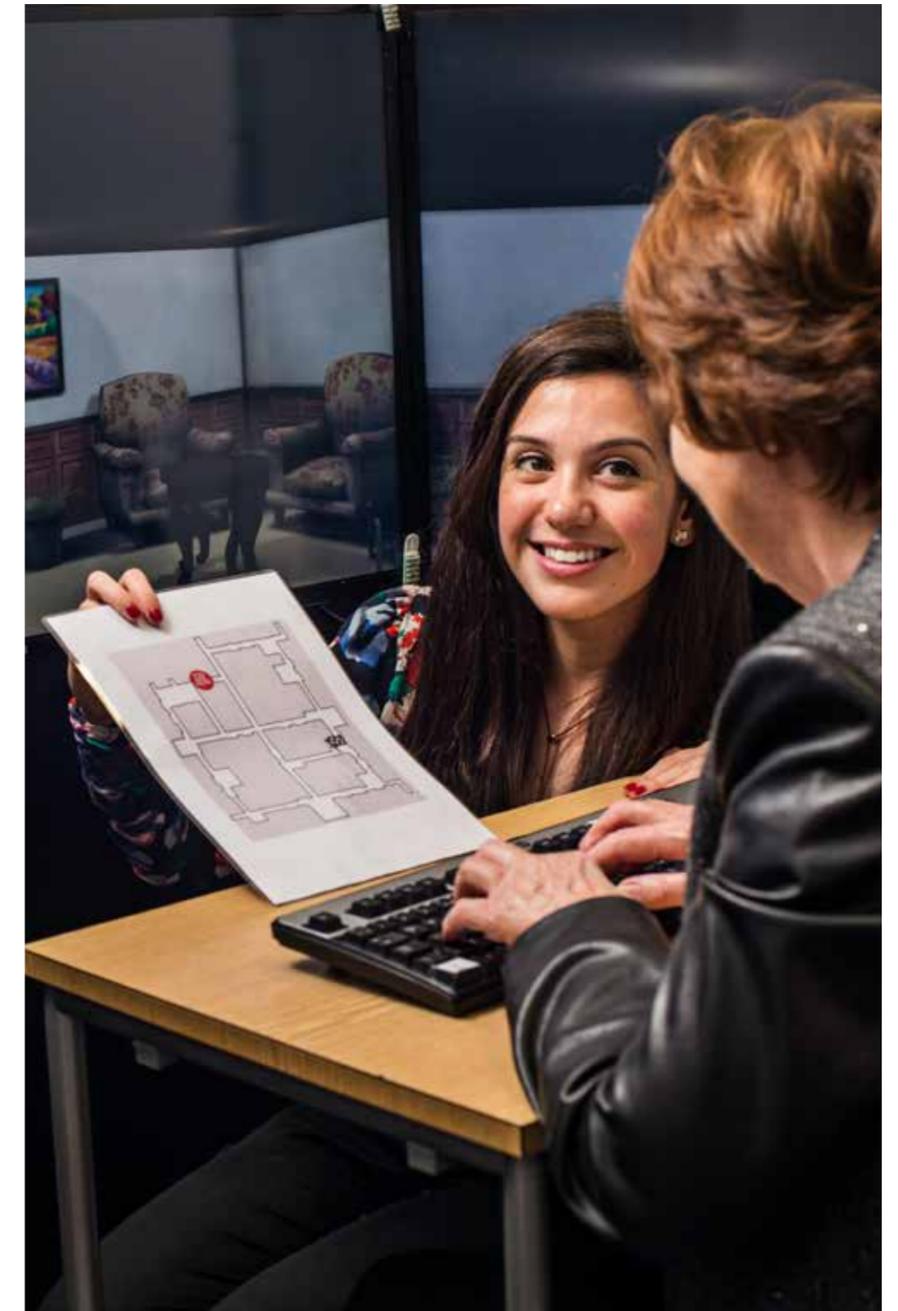
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In order to carry out her research, Mary has been going to retirement homes and care homes, and learning from their residents about their experiences of navigating their environments. She has also been using some of the state-of-the-art technology available in the Psychology Department to create virtual environments that older people navigate their way around.

One of her studies looked at how people learn a new route and which navigational strategies people use when learning it. "The results showed that older adults who performed lower on a neuropsychological assessment, suggesting possible atypical ageing, had difficulties with some specific measures of route memory – they found it hard to translate and to identify a recently learned route from a map perspective, and interestingly, there were significant differences between two separate forms of landmark memory which we would like to further investigate," explains Mary.

"We want to follow-up these findings with a second study which will explore how useful 'you are here' maps are for certain demographics and in certain environments," says Mary. "Additionally, we want to see whether a certain placement of landmarks would make a difference in how well a route is learned. For this we are going to be using a virtual care home environment, which will allow us to change the variables, such as corridor layout and where landmarks are placed."

Mary's research is already having an impact, as one of the retirement homes where



she has been carrying out her qualitative research is intending to have a full re-design based on the findings and reports made by the residents living there. Ultimately, Mary's aim is to use her research to influence designers and architects to create built environments that are easier for older people and people with memory loss to navigate. The main tool for achieving this will be through informing building guidelines and regulations – something Mary is keen to develop.

O'Malley, M., Innes, A. and Wiener, J.M., (2015) Decreasing spatial disorientation in care-home settings: How psychology can guide the development of dementia-friendly design guidelines. *Dementia* (London, England).



# LIFELONG HEALTH AND WELLBEING

## Destination FeelGood



Tourism is one of the UK's most important industries; from staycations to summer breaks, tourism injects millions of pounds into the UK economy every year as holidaymakers descend on British shores in search of some much needed rest and relaxation.

One aspect that more and more holidaymakers are looking for is an element of wellness in their holiday; whether it is windsurfing or yoga, spa treatments or adventure trails – a wellness element can enhance, and often sell, a holiday. Despite tourism being such a booming industry, there are still lessons that can be learned to help boost the British tourism industry, which is where research project Destination FeelGood comes in.

Destination FeelGood engages with businesses to help them improve their wellness offering for holidaymakers. The project works with businesses and shows them how to innovate in market positioning while developing strong competitive local tourism economies. Essentially the project looks to encourage businesses to develop wellness packages or elements that will enhance their ability to provide

holidaymakers with the type of holiday they are looking for and, in turn, increase footfall and profits.

The project is being led by a team of academics and students at BU. One such student is Carmen Martins, who is studying for her PhD at BU while working on the project. Carmen says: "My research specifically is on rural tourism innovation of which wellbeing is a key feature."

Carmen continues: "Through an increased understanding of how wellbeing can 'sell' a holiday for consumers, tourism businesses are well placed to improve their marketing effectiveness, and to develop new products and services that will provide an enhanced experience for visitors to the destination."

To facilitate the exchange of knowledge, staff from BU's Faculty of Management,

Bournemouth University and the National Coastal Tourism Academy (NCTA) have been working together to develop an integrated programme of activity for businesses across the wider local tourism economy.

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"Tourism businesses were able to increase their marketing effectiveness, and develop new products and services that would provide an enhanced value-added experience for visitors."

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The project has been underpinned by research into the tourism industry that has been conducted at Bournemouth University. This research suggests that successful destination marketing may provide the economic impetus to transform local tourism products using wellbeing as a driver for the marketing. The project helps both businesses and destinations to think more carefully about their marketing strategy and how they can better set themselves up to be more attractive to holiday makers seeking rest and relaxation.

Carmen has been working alongside academics such as Professor Heather Hartwell, Professor Adele Ladkin, Professor Ann Hemingway, Professor Stephen

Page and Dr Cheryl Willis, as well as the NCTA, to deliver the project as a part of a multidisciplinary team.

She says: "Within the team there are tourism academics and health academics and that is what makes the project so unusual. We had support from the Royal Society for Public Health in London. We also had input from students. A number of aspects of the project sought to involve students from Bournemouth University across the tourism, leisure and hospitality sectors to enhance both the project and the student learning experience."

The project has already had a significant impact for businesses, as Carmen explains: "This project offered the opportunity for connecting different destination stakeholders, with the specific aim of facilitating innovation in healthy lifestyle products while contributing to a competitive local tourism economy. Through inter-stakeholder dialogue, tourism businesses were able to increase their marketing effectiveness, and develop new products and services that would provide an enhanced value-added experience for visitors. The project gave tourism businesses an improved understanding of wellbeing and the confidence to implement this direction within their marketing schema."

Businesses such as the Sandbanks Hotel and Monty's Lounge restaurant have been

working with the team in 'ideas cafes' to come up with ways to innovate and develop more of a wellness offering, as well as looking at ways of promoting this aspect of their business to market to the type of people who find wellness to be an important part of their holiday.

Plans are in place to continue to roll the project out across the UK to other businesses and destinations.

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Fyall, A., Hartwell, H. & Hemingway, A. (2013) Public Health, Wellbeing and Tourism: Opportunities for the Branding of Tourism Destinations. *Tourism Tribune*, 28, p16-19.

Hartwell, H., Hemingway, A., Fyall, A., Filimonau, V. and Wall, S. (2012) Tourism engaging with the public health agenda: Can we promote 'wellville' as a destination of choice? *Public Health* 126 (12), p1072-1074

For more information visit [www.destinationfeelgood.co.uk](http://www.destinationfeelgood.co.uk) or follow @DestinationFG on Twitter.

The research was made possible thanks to funding from the Economic and Social Research Council.



## LIFELONG HEALTH AND WELLBEING

### Improving orthopaedic practice and patient care



Living well in older age is increasingly becoming a concern for our society. A key priority for our health services is to enable people to stay healthy and independent for as long as possible. BU's newly established Orthopaedic Research Institute (ORI) is addressing this need by carrying out research to improve orthopaedic practices and patient care, thus supporting people to improve their activity levels and mobility as they age. Orthopaedics will become a critical issue as our population ages, as longer and more active lives will increase the risk that joints will wear out and replacements or treatments will be needed.

Deputy Head of ORI Associate Professor Tom Wainwright explains: "Knee and hip problems are going to become more prevalent, so we're going to need better solutions to manage that; whether it's better surgical procedures or better non-surgical interventions. We have some very effective treatments in orthopaedics, but they're not 100% effective, so part of our role is to work out how to make them better – improve them, through developing better surgical techniques, testing new medical technology or developing better rehabilitation processes."

Between them, Associate Professor Wainwright and Head of ORI Professor Rob Middleton have a wealth of clinical and research expertise. Professor Rob Middleton is a practising orthopaedic surgeon, specialising in hip replacement, while Associate Professor Wainwright is a physiotherapist and clinical researcher. They carried out research alongside their clinical practice before joining BU and have a national and international reputation for their work to date.

One of their biggest successes so far is speeding up the recovery process after hip

and knee surgery, which has led to their work being cited in best practice health guidelines around the world. This approach, called Enhanced Recovery after Surgery, seeks to minimise the impact of surgery and accelerate recovery by employing strategies throughout the patient pathway, to improve outcomes and reduce the need for medical interventions. Their research into this area was a first in the UK for orthopaedics and demonstrated its value to patient care, as well as showing an improvement in patient and staff satisfaction and leading to significant cost savings to hospitals.

"As well as developing interventions to help patients recover from surgery and manage their conditions, we also work with a number of global orthopaedic companies to test and run clinical trials on the latest orthopaedic technology."

A more recent example of their work is a programme developed with local partners in Dorset called CHAIN – Cycling Against Hip Pain – which is designed to help people to live well with conditions such as osteoarthritis and to improve their mobility. The programme provides a combination of education and static cycling sessions, designed to improve mobility and increase people's confidence in managing their conditions.

The results have been excellent, with patients reporting improvements in walking, finding daily living tasks easier and most importantly, decreases in pain. Even the least likely candidates have seen improvements, demonstrating the value of education and exercise in improving patient care and in helping to reduce or delay the need for further medical interventions.

"As well as developing interventions to help patients recover from surgery and manage their conditions. We also work with a number of global orthopaedic companies to test and run clinical trials on the latest orthopaedic technology," says Associate Professor Wainwright. "We work with companies such as ZimmerBiomet, Lima Corporate, and Firstkind Ltd to ensure that their technology is delivering the best possible outcomes for patients."

One example of their work with ZimmerBiomet was to explore ways to improve the technology used in hip replacements. The hip joint is a ball and socket joint and one of the risks of hip replacement is dislocation; where the new ball comes out of the socket. ORI's research has shown that a larger ball reduces the risk of dislocation, and does not adversely affect the rate of wear.

"We currently have five trials underway within local hospitals and more to come," explains Associate Professor Wainwright. "These trials are looking at different ways that we can improve the medical technology used in orthopaedics and means that not only are we contributing to improving future care, but we're also bringing the latest technology to Dorset and improving care in the local area. As Dorset has a very high proportion of orthopaedic surgeries, there is potentially a very large group of people we can benefit."

"We take a very interdisciplinary approach to our research. Establishing ourselves within BU is a real advantage for us, because we can draw on the expertise of colleagues in other areas of research, including other health professionals, psychologists, technologists and engineers.

"Ultimately, our driving force is that we want to ensure that everyone gets the best possible treatment for their condition – it's just the right thing to do."

Wainwright, T.W., Immins, T. and Middleton, R.G., (2015) A cycling and education programme to promote self-management and to increase functional ability in patients with osteoarthritis of the hip. *Osteoarthritis and Cartilage*, 23 (2), 372.

Howie, D.W., Holubowycz, O.T., Middleton, R. and Grp, L.A.S., (2012) Large Femoral Heads Decrease the Incidence of Dislocation After Total Hip Arthroplasty A Randomized Controlled Trial. *Journal of Bone and Joint Surgery – American Volume*, 94A (12), 1095-1102.

Wainwright, T. and Middleton, R., (2010) An orthopaedic enhanced recovery pathway. *Current Anaesthesia and Critical Care*, 21 (3), 114-120.

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