

Transforming  
hospital signage

Hana Kmecova

Animation  
in Africa

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Epidural  
simulator

Dr Venky Dubey

The ethics  
of food  
production

Dr Mark Maltby

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**Research at BU**

Making a difference,  
enriching the world

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## Introduction

Vice-Chancellor Professor John Vinney ..... 04-05

News in brief ..... 06-11

## Health, Wellbeing & Ageing

Epidural simulator / Dr Venky Dubey ..... 12-13

## Technology & Design

Epidural simulator / Dr Venky Dubey ..... 12-13

## Communities, Cultures & Conflicts

#Politics / Dr Darren Lilleker ..... 14-15

The ethics of food production / Dr Mark Maltby ..... 16-17

## Creative, Digital & Cognitive Science

Transforming hospital signage / Hana Kmecova ..... 18-19

Centre for Digital Entertainment / Karsten Pedersen ..... 24-25

Animation in Africa / Paula Callus ..... 30-31

## Ageing, Society & Dementia

Falls prevention / Dr Samuel Nyman ..... 20-21

## Entrepreneurship & Economic Growth

Entrepreneurship & Economic Growth: BU impact ..... 22-23

Digital destinations / Dr Philip Alford ..... 26-27

## Leisure, Recreation & Tourism

Digital destinations / Dr Philip Alford ..... 26-27

## Biodiversity, Environmental Change & Green Economy

Ecological restoration / Professor Adrian Newton ..... 28-29

L-R: Professor John Vinney with psychology researchers Dr Samuel Nyman and Dr Sarah Bate using BU's mobile eye tracker.

Awarded a Queen's Anniversary Prize for our pioneering approach to computer animation



# Welcome to the Bournemouth Research Chronicle

This is a landmark edition as it provides a snapshot of some of the work that BU has submitted to the Research Excellence Framework (REF) 2014. In particular it focuses on the societal impact of our research, which forms a key part of REF2014.

In the previous 2008 Research Assessment Exercise (RAE), over 40% of BU research was rated as 'internationally excellent' with 8 out of 10 subject areas featuring research that was rated as world-leading.

In the five years since, BU's Research Council income has increased by 81% and EU research income has increased threefold. Our researchers continue to contribute to some of the world's leading academic journals such as *Science*, *Proceedings of the National Academy of Science* and the *Proceedings of the Royal Society*.

I am particularly proud of the impact our research is having on society. Through co-creation with industry, policy makers and other research users, we ensure research outputs deliver impact where it is most needed. Be it at a community, national or international level, work from our eight

societally-driven themes helps a wide range of beneficiaries.

Some particular highlights featured in this edition include the multidisciplinary research in the Communities, Cultures & Conflicts theme that is facilitating prosecutions for international crimes against humanity (page 8); research-based training in the National Centre for Post Qualifying Social Work that has now been delivered to the equivalent of 25% of the entire social care workforce in the UK (page 6); and Biodiversity, Environmental Change & Green Economy research that informs UN and EU policy on subjects such as species management and ecological regeneration (page 9).

Through co-creation between researchers, undergraduates and postgraduates we are achieving great things and enhancing the

learning experience along the way. This has contributed to BU being the first university to receive a 'commended' judgement for the quality of student learning by the Quality Assurance Agency for Higher Education (QAA).

As we continue to create world-class facilities to enable world-class performance, I have no doubt research will continue to flourish at BU, further increasing the positive impact for both research users and students.

I am proud of the work that BU researchers and professional services staff have put into preparing the university's REF submission and it gives me great pleasure to present some of this outstanding research here in the BRC.

**Professor John Vinney, Vice-Chancellor**

## National Centre for Post Qualifying Social Work provides research-based training for the social care workforce

Social work is about making a positive difference to the most vulnerable in society and BU's National Centre for Post Qualifying Social Work facilitates this through continuing professional development (CPD) provision for practitioners.

To date the Centre has now provided research-based training to 10,515 health and social care professionals, which equates to 25% of the social work workforce.

In the last five years the team has worked with 28 NHS trusts, 96 local authorities and 39 other major employers in England including the British Forces Social Work Service. This includes over 500 practice educators, 500 social work managers, 500 adult and childcare social workers, 1,600 mental health practitioners, and 2,900 completing the first 'consolidation' stage of a social worker's CPD.

The Centre's primary research themes both develop and simultaneously evaluate the effectiveness of the training provision. They include developing reflective practice, identifying learning needs and future provision, evaluative research tools and assessment of the impact of CPD on the practice of social workers and their organisations.

Those participating have developed professionally from the Centre's self-reflective approach, demonstrating increased confidence and improved management abilities.

The Centre has now received funding to work in partnership with the Centre for Workforce Intelligence (CfWI). BU staff will help develop CfWI's social worker supply-and-demand model and support workforce modelling and forecasting in the wider health and social care sector.

## UK MS Society endorses BU's FACETS programme

The UK MS Society has endorsed a BU and Poole Hospital programme to help people with multiple sclerosis (MS) to manage fatigue.

Fatigue affects the majority of people with MS and differs markedly from the sort of tiredness experienced by the general population. It can stop those affected from working, socialising and leading a full life.

Dr Sarah Thomas and Professor Peter Thomas from the BU Clinical Research Unit, along with collaborators from the Dorset MS Service at Poole Hospital, have developed a group-based fatigue management programme called FACETS (Fatigue: Applying Cognitive behavioural and Energy effectiveness Techniques to lifeStyle).

The programme combines lifestyle strategies with cognitive behavioural approaches. Its aim is to help people with MS normalise their fatigue experiences, use available energy more effectively, and learn helpful ways of thinking about fatigue.

A national randomised controlled trial found that 40% of participants who received FACETS as well as their routine care had a meaningful improvement in fatigue levels, compared with 19% of those who received current local practice only.

The MS Society-funded trial was led by Professor Peter Thomas and included 164 participants from Poole, Bristol, Southampton and Portsmouth. Results were published in the *Journal of Neurology, Neurosurgery & Psychiatry*. <http://jnnp.bmj.com/content/early/2013/07/09/jnnp-2012-303816.full.pdf>

The UK MS Society is now supporting the national delivery of FACETS training courses for health professionals. Contact [education@mssociety.org.uk](mailto:education@mssociety.org.uk) for further details.

## Prosopagnosia

Prosopagnosia, or the inability to recognise faces, affects one person in fifty, but public and professional awareness of the condition is low.

Dr Sarah Bate and colleagues from BU's Centre for Face Processing Disorders (CFPD) are providing cognitive screening and training programmes to improve recognition skills for affected adults and children.

The Centre has grown significantly and, having tested over 100 people for prosopagnosia, now has a growing clinical practice. Treatment includes cognitive training and inhalation of the hormone oxytocin, which Dr Bate's work has shown provides a temporary improvement in face recognition skills. The Centre is also developing bespoke prosopagnosia diagnosis and treatment for a range of conditions, including autism and Moebius syndrome.

As well as these advances in diagnosis and treatment, Dr Bate's research has led to recognition of the condition by the NHS and various related charities.

## Humanising care

The Francis Report heralds an overdue wake-up call that something is missing in current health and social care practice. Professor Les Todres, a psychologist who developed this approach at BU with Professor Kathleen Galvin, characterises this missing link as 'humanly sensitive care'.

They believe that a humanising focus depends on two foundational assets: A distinctive and simple 'vocabulary' that

keeps the focus on 'humanisation' issues, as well as ways of ensuring that such a focus is coherently championed at all levels: political, organisational, practical and educational.

Having developed a framework of humanised care that could apply to people with a wide range of conditions, Professor Todres, Professor Galvin and colleagues now hope to improve the human dimensions of care for others. They believe the framework has multiple potential applications and are examining a generic implementation strategy that incorporates the patient's experience and involvement, as well as providing 'top down' policy and organisational support.

## Breastfeeding

Breastfeeding has enormous advantages for both newborn infants and their mothers.

However, UK breastfeeding rates are low. For example, 81% of women initiate breastfeeding, but only 17% exclusively breastfeed at three months. This compares badly with 60% of women breastfeeding at three months in many EU countries.

Support for breastfeeding is key to its success, and research from the Centre for Midwifery, Maternal and Perinatal Health (CMMPH) has provided valuable insights into the factors that help mothers continue to breastfeed.

The research has been used to develop the advice and support available on [Healthtalkonline](http://Healthtalkonline). This successful breastfeeding support website is regularly used by around 1,500 mothers every month. The site is an invaluable resource for breastfeeding mothers because it provides easily accessible and round-the-clock consistent advice from a trustworthy evidence-based source. Unlike many evidence-based sources, which make for dry and sometimes difficult reading, the [Healthtalkonline](http://Healthtalkonline) pages present information through real, relatable stories.

A recent survey found that users were very positive about the quality and coverage of the information. Nearly all (97.4%) considered the webpages helpful. More importantly though, responses demonstrated changes in users' behaviour or attitudes: 7.7% of respondents had decided to continue breastfeeding or start breastfeeding after visiting the [Healthtalkonline](http://Healthtalkonline) website. In addition, the website is gaining an international following, with users from as far afield as Australia, New Zealand, the USA and Canada.

# Forensic investigation of mass graves

**R**igorous forensic investigation of mass graves is important for two reasons. Firstly, evidence can be used in international criminal prosecutions, bringing those responsible for such atrocities to justice. Secondly, there is an overwhelming need for families to know the truth about their loved ones and carry out burial and commemoration rituals. This need is mirrored in international human rights and humanitarian law, which demands bodies are recovered, identified and properly buried.

Before BU's research there were no comprehensive published standard protocols or policies for the scientific investigation of mass graves. Lack of consistency and understanding in forensic and scientific processes could lead to evidence not withstanding legal scrutiny.

BU's multidisciplinary research in forensic archaeology and anthropology (by Ian Hanson and Paul Cheetham) and international law (by Dr Melanie Klinkner) has informed and developed standards and universal policies.

Protocols were used to teach Iraqi trainees at the university under a US State Department/ FCO funded program. The International Commission on Missing Persons (ICMP) has since used these protocols and a review of the legal framework for international law, as the basis for their own training manual for further training in Iraq and Libya.

The protocols were also used as the basis for investigating graves of missing First World War soldiers at Fromelles in France. This particular project has significant humanitarian impacts, providing long sought after answers to the families of those missing in action since 1916.

# Stonehenge visitor centre

**A** new multi-million pound visitor centre has opened at Stonehenge, featuring a life-size reconstruction of a Neolithic house. It is based on the knowledge of settlement activity uncovered by BU researchers during the Stonehenge Riverside Project.

BU's Dr Kate Welham, a co-director of the project, said of the centre: "When we excavated the houses we only saw the floors. It's amazing to see them reconstructed using the exact measurements taken by BU students and researchers."

Visitors will be able to go inside the houses and see where people slept and ate 4,500 years ago. "I was struck by how big the houses are," Dr Welham observed. "They are roomy and comfortable and you could easily fit ten people comfortably around the hearths in the centre. Visitors will really be able to experience what it was like to be part of the Neolithic community that built Stonehenge all those years ago."

The new centre will also display artefacts uncovered by BU archaeologists during the Riverside Project and from Professor Tim Darvill's investigations inside the stone circles themselves. These include flint arrowheads, pieces of ceramic cooking pots, and other day-to-day essentials from Neolithic life.

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"Visitors will really be able to experience what it was like to be part of the Neolithic community that built Stonehenge all those years ago."

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BU's Professor Darvill also features as one of the "Talking Heads" in a series of video interviews with archaeologists past and present who have worked at Stonehenge. He explains his research and his theories about what the monument was used for.

All the displays are presented in relation to a timeline for the Wessex region that is largely based on a new chronology for sites in the area established by the research carried out by Professor Darvill and Dr Welham.

# Striking the right balance between coastal bird conservation and the needs of society

**H**uman activities and manmade structures can negatively affect bird populations. Until recently, however, there was no robust method to quantify the impact.

To address this issue, BU researchers have developed unique computer modelling techniques to predict how human activities affect coastal birds. This has informed the coastal management of 35 sites in Europe and one in Australia, including shellfisheries, wind farms, bridges, tidal barrages and nuclear power stations. In England specifically the technique has been applied to 812 km<sup>2</sup> (29%) of protected coastal habitat.

The computer models apply extensive behavioural research by Professor Richard Stillman and Professor Ralph Clarke, which shows how birds interact with their competitors, prey, humans and the environment.

With no other alternatives to quantify the risk to birds, this research is truly innovative. The method gives coastal managers the evidence to make informed decisions that weigh up the cost to birds with the benefits to society. This avoids the precautionary principle of banning human activities that are not in fact harming the birds.

# Managing non-native fish

**B**U research into the ecological management of non-native fish has had a significant impact on environmental policy, helping to protect a fisheries industry worth over £3 billion per year in the UK alone.

The research by Dr Rob Britton, Dr Demetra Andreou and their colleagues has informed regulations, policy and management programmes to protect European biodiversity from the adverse impacts of non-native fish.

Their research has revealed that whilst the majority of introduced non-native species have few adverse ecological consequences – and can bring substantial socio-economic benefits – a minority cause substantial ecological harm.

This information has been applied to EU risk assessment and quarantine measures for the management of non-native fish. It has also provided the scientific base for the Environment Agency's management of the invasive *Pseudorasbora parva*, more commonly known as topmouth gudgeon, from UK freshwaters.



# Evidence-based regulation of intellectual property

The Centre for Intellectual Property and Policy Management (CIPPM) is a multidisciplinary research cluster at BU.

The Centre's ethos is to bring evidence-based academic rigor to the regulation of intellectual property.

As a result, the research has become an increasingly important resource to those involved in the legislative process. In 2013, researchers provided the evidence base for proposed copyright exceptions in relation to parody and orphan works and for an Open Standards policy in Government IT Procurement.

The Centre has recently received an Arts and Humanities Research Council (AHRC) grant to analyse the strategies the music publishing industry has employed to adapt its business model to new technologies and legislative changes.

Researchers also won a tender from the UK Intellectual Property Office to investigate the current state of the art in relation to 3D printing and its effects on Intellectual Property law. The commissioned research will inform policy in the area.

## Functional Electrical Stimulation

Functional Electrical Stimulation, or FES, is a method of externally controlling muscles when signals from the brain can no longer control movement. This can happen after a spinal cord injury, stroke or neurological disease such as Multiple Sclerosis (MS).

A range of FES devices have been developed by Professor Ian Swain and his colleagues in Odstock Medical Ltd (OML) and Salisbury Hospital. Well over 10,000 have been sold in 18 countries through OML, which is the first NHS commercial company in England.

BU's fundamental engineering research, including that of PhD students working in Salisbury, has been a key factor in developing these intelligent systems, which have improved the quality of life for patients with neurological disabilities across the globe.

## Software development

An important part of software systems development is to produce software that meets the needs of its users effectively. This includes working with industry to improve software methods and produce effective and accessible software tools.

BU research expertise has been applied in a variety of contexts. These range from large industrial projects with Bosch automotive in Germany, to local work with small and medium-sized enterprises such as the software and service solution supplier, Morning Data. The enhanced development processes have delivered significant financial savings to these organisations.

## Developing sustainable technology to power Poole by the tide

Dr Zulfiqar Khan and his colleagues in BU's Sustainable Design Research Centre are developing renewable technologies to transform Poole Harbour's tidal energy into electricity or heat.

With parts of the harbour designated areas of outstanding natural beauty, there is the additional challenge that technology does not invade the scenic beauty of the area.

The research team are developing nano coatings to enhance durability of mechanical current turbines. The coatings improve wear and corrosion resistance in sea water applications. Solar-thermal technologies are also being developed.

# Promoting understanding of sexuality and ageing

BU researchers Dr Lee-Ann Fenge and Dr Kip Jones are using novel methodologies to engage 'seldom heard' voices of older lesbian, gay, bisexual and transgender populations.

One of these tools is a method deck, distributed to local and national agencies to support their diversity training.

The method deck consists of a range of colourful playing cards, which include exercises, suggestions for activities and brain-storming ideas. The aim is to support practitioners to reflect on their own practice, which influences the experiences of older lesbians and gay men in their local communities.

The deck was informed by research from the Big Lottery funded Gay and Grey Project (2006) and the UK Research Council funded The Gay and Pleasant Land? Project (2009-2012).

The major output from the Gay and Pleasant Land project is the award winning research-based film 'Rufus Stone'. The trailer is available online: <http://vimeo.com/43395306>

## National Trust

In the early 1990s the management of heritage properties tended to be heavily custodial, ignoring the hedonistic aims of most visitors. There was a sense that properties should be respectfully admired rather than enjoyed.

BU researchers have worked with the UK's largest conservation charity, the National Trust, to help redress the balance and make heritage accessible and more enjoyable to a wider audience.

The research demonstrated how visitors can enjoy properties without compromising aesthetic and historic integrity. This led to the development of methodologies to assess visitor enjoyment and Key Performance Indicators (KPIs) for individual properties.

BU delivered this technique across 200 of the 272 properties. In the last five years National Trust membership has increased from 3.6 million to 4 million, with visitor numbers increasing from 15 million to 19 million.

## The Year of Natural Scotland

Professor Adam Blake led a research project commissioned by the Scottish Government to estimate the size and economic contribution of wildlife tourism in Scotland.

This project estimated that wildlife tourists spent £276 million in Scotland during 2009, which contributed £65 million to Scotland's gross domestic product and 2,763 full-time equivalent jobs.

This contributed to the evidence base that led to VisitScotland naming 2013 the "Year of Natural Scotland".

# Epidural simulator

Working with medical colleagues to improve the patient experience and reduce risk of harm

Thousands of epidurals are performed by doctors every year.

The procedure is commonly used for pain-relief during childbirth, the treatment of chronic back pain or as a means to provide anaesthesia during operations.

Inserting an epidural needle into the spine requires great skill and extensive training, and can be challenging even for experienced anaesthetists. Obesity poses further difficulties, due to technical problems locating the epidural space.

Currently around one in every 100 epidural procedures lead to a post-dural puncture headache, one in 6,700 cause a neurological injury and approximately one in every 80,000 will result in permanent harm.

Professor Michael Wee from Poole Hospital explains: "One of the most common problems after an epidural for labour is what is called a dural tap, where the epidural needle punctures the covering of the spinal cord and causes leakage of spinal fluid. This may cause a debilitating headache for the mother and prevent her from caring for and enjoying her newborn. There is a need to provide precise training in a delicate clinical procedure which has potentially devastating effects when things go wrong."

Medical devices being developed by Bournemouth University and Poole Hospital will help doctors to carry out the procedure – and reduce the risk for patients.

"I decided to team up with BU's School of Design, Engineering & Computing as it has the necessary expertise and skills in developing the epidural simulator," says Professor Wee.

The project is being led by BU's Dr Venky Dubey, alongside PhD student Neil Vaughan, Professor Wee and Dr Richard Isaacs, also from Poole Hospital.

Dr Dubey believes they can dramatically reduce the risks associated with the procedure by providing training on a state of the art epidural simulator, thereby reducing the learning curve.

He says: "You don't know with each patient how far the epidural needle has to go. It varies from person to person and it is very difficult to tell.

"It is all based on training and experience – when doctors are inserting the needle into the spine, they know they have reached the epidural space as there is a loss of resistance.

But even for an experienced anaesthetist it is quite difficult, because different people have different body shapes and sizes. Our proposed epidural simulator will allow us to simulate all types of body conditions to allow doctors to practise the technique."

The team has developed software which uses information such as a patient's height,

weight and body shape and integrates it with ultrasound and MRI scans to predict where their epidural space will be.

Dr Dubey adds: "The ultimate aim is to have a novel epidural simulator which accurately replicates individual characteristics and gives doctors experience of the procedure without them having to practise on a patient."

The devices have been tested on porcine cadavers and clinical trials on patients have looked at the relationship between Body Mass Index (BMI) and the epidural ligaments pressure.

"The ultimate aim is to have a novel epidural simulator which accurately replicates individual characteristics and gives doctors experience of the procedure without them having to practise on a patient."

The trials found that as patient BMI increases, the epidural ligamental pressure decreases; the patients with the lowest BMI had the highest mean pressure. This is a new and important finding.

The project has already received international attention, and recently won the Institution of Engineering and Technology (IET) Innovation Award in the Information Technology category. It has also been shortlisted for a number of prestigious awards – including in the Technology and IT to Improve Patient Safety category at the National Patient Safety Awards 2013, the American iShow, and the International Student Design Showcase 2013 – which it won.

It was also the only UK-based project at the American Society of Mechanical Engineers (ASME) Innovation Showcase, competing against Ivy League universities.

"Nobody has done anything like this before – there's quite a buzz about it," says Dr Dubey.

The team eventually hopes to commercialise the simulator and industry partners are interested in the work. [BRC](#)



L-R: Neil Vaughan, Professor Wee and Dr Dubey.

# #Politics

Enhancing politicians' communication to increase public engagement

In a digital world there is an expectation that public figures are constantly within reach and easy to communicate with. That is what BU's Dr Darren Lilleker is teaching politicians in a bid to reform how they communicate with the public, specifically through the use of social media.

"Getting people involved in politics is important for democracy," he explains.

"Social media today plays the role the soapbox did 100 years ago. People are becoming aware of different political ideas, getting involved and feeling empowered."

Dr Lilleker and his colleagues were invited to advise leading members of the UK House of Lords on the use of social media. Researchers developed a training programme to introduce MPs to online communication platforms such as Twitter, Facebook and blogging.

"We consistently find that if politicians are willing to use social media to ask questions and encourage feedback on current affairs, they gain a strong online following of individuals who are active and willing to support their campaigns," he says.

For a number of years Dr Lilleker and his colleagues have been researching the use of Web 2.0 in politics and the impact on public engagement. This has highlighted that a proactive communication strategy has a range of advantages. It can build reach in online networks, encourage feedback on campaigns, increase coverage in the media, build relationships with members of key stakeholder groups, create communities of interest who can then be mobilised to support important political campaigns, and increase the politician's authority within interest groups.

"Social media provides access to a wide range of demographics, many of whom traditionally would never contact a politician," says Dr Lilleker. "A social media presence makes the politician seem accessible, gives a sense of their personality, but most importantly it can get ordinary people involved in politics. It is therefore a win-win situation. The politician

gains an active audience while those they engage become empowered and active politically."

Lord Knight of Weymouth, formerly Jim Knight MP for South Dorset, took part in the training: "In the Lords, I find a growing appreciation of the need for effective political communication coupled with nervousness about how it all works," he says. "Darren's expertise in this field and his understanding of a wider range of communication practices and techniques has been invaluable in helping Parliamentarians reconsider the way they talk to each other and engage with the public – particularly through social media."

Equally as important as a proactive political communications strategy though, is measuring its success. Dr Lilleker is offering analysis on the time invested in communicating with the public through social media and how it has added value to their campaigns.

Measured analytics already show that this research is making a difference. Analysis of the Legal Aid reform debate showed that Lords who used Twitter were reference points among users (measured by retweets)

and saw greater media coverage. Similar results were found during the debate on Lords reform.

"Getting people involved in politics is important for democracy. Social media today plays the role the soapbox did 100 years ago."

Dr Lilleker hopes the research will continue to have impact for many years to come as more politicians communicate with their audiences through social media. He and his team are producing a best practice guide that will help them to achieve this goal and teach many politicians that digital communication is not only a tool for the future, but a tool for the present too.

"It is amazing what can happen in 140 characters," he concludes. "One short political tweet can be the start of a whole campaign if politicians become more proactive and get to grips with social media use." BBC

Chickens are a vitally important food source across the world, with serious economic, environmental and ethical concerns surrounding their breeding and keeping. Recent food scares such as the horse meat scandal highlight more than ever how important it is that we understand the practices behind our food production.

Despite this significance, there is little detailed analysis to date documenting the natural and cultural history of chickens in Europe. In response to the long overdue need for research in this area, the AHRC has awarded a £1.94 million Science in Culture award to a team of researchers to study human interactions with chickens.

This grant, secured after the team submitted a competitive bid to the AHRC, will radically inform how we manage and perceive chickens as a food source in the future.

Project lead Dr Mark Maltby from BU says: "We will examine how the chicken spread from its humble origins in the jungles of south-east Asia to become the most widely established livestock in the world. The project will examine how chickens have changed society and culture and will ask how evidence from the past can be used to transform modern practices of chicken management."

The research will provide both a philosophical review and solid empirical evidence to inform these hotly debated ethical topics. Researchers will also work directly with breeders and keepers to keep them informed of developments in management strategies and they will also have the opportunity to provide samples for analysis.

The project team will consolidate and integrate vast amounts of osteological, stable isotope, DNA and lipid data selected from archaeological and modern samples of chicken bones and eggs across Europe. These datasets will be accessible to researchers in a range of disciplines, including genetics, and will help identify trends and patterns that can inform future practices such as diet and disease management.

In addition, this project brings significant community benefits. The familiarity of chickens makes them an engaging cultural and educational reference point for school children learning about natural history. Working with educational artist Ben Frimet, the research team will develop projects to display in public spaces within inner-city London. Exhibitions will take place at the Natural History Museum, Museum of London and Fishbourne Roman Palace, along with a documentary and the 'Chicken Trail' with accompanying tourist guide.

"We will examine how the chicken spread from its humble origins in the jungles of south-east Asia to become the most widely established livestock in the world."

For 8,000 years chickens have provided meat, eggs and feathers, and have widespread use in cockfighting, religious ritual, medicine and even magic. Given the wide-ranging social and cultural significance of this species, this project will have impacts that are equally significant.

The full grant is entitled "Cultural and Scientific Perceptions of Human-Chicken Interactions" and is led by Dr Mark Maltby, alongside colleagues from Durham University, University of Leicester, University of Nottingham, University of York and Roehampton University.

The universities involved are funding seven PhD studentships as part of the project, including two at BU, which are currently being advertised. [BRC](#)



# The ethics of food production

Ethical concerns about battery farming challenge views on chicken production. Research at BU will help inform the rights and wrongs of these debates

# Transforming hospital signage

PhD student Hana Kmecova transforms signage to help patients and visitors navigate their way through complex hospital environments

18

Having worked with hospital buildings during her Master's in Architecture, Hana Kmecova became acutely aware of how difficult it is for patients and visitors to navigate their way through the maze of departments and corridors.

"I was continually aware of the difficulties people have finding their way round these complex buildings," she explains. "Not only can it lead to missed appointments and added anxiety at an already difficult time, but regardless of how good the medical care is, the user has already had a negative experience of the hospital before they even

reach their destination. And then there is the added pressure on staff workload. Frequent interruptions with wayfinding queries can impact on staff work performance and satisfaction."

This revelation inspired a change of direction for Kmecova's academic career. In 2010 she joined BU's Wayfinding Research Centre (WRC) as a PhD student, funded by CISCO Systems. She quickly began contributing to the development of a research-driven approach to this common wayfinding problem.

Kmecova set about revolutionising the historically problematic signage at the local Poole Hospital. She explained: "The hospital faces the same challenges as many hospitals whose sites have had various services and buildings added over time. Poole Hospital is located on a steep hill and the long and narrow layout, with uneven levels and

numerous entrances, makes it an ideal representation of the wayfinding challenge.

First Kmecova tested the effectiveness of existing maps and found nearly half of participants could not use them properly. This was largely down to obsolete information, lack of organisation, misalignment and no indication of current position.

Using a combination of theoretical research, lab-based studies and mobile eye-tracking technology, Kmecova determined the primary factors influencing comprehension and made a range of recommendations to the hospital. These included aligning map orientation with the direction the person is facing, reordering information, reducing visual complexity, adding You-Are-Here symbols, and introducing important directional cues, such as magnified map inserts with immediate directional information.

One of the most important changes was a reorganisation of information to ensure people do not have to process too much in one go, only receiving exactly what they need at the different stages of their journey. Under Kmecova's revised signage system, upon entering the hospital, users now identify which block they need as opposed to a specific department. Once they reach the block, they then receive further wayfinding aids to prompt them on the next leg of their journey.

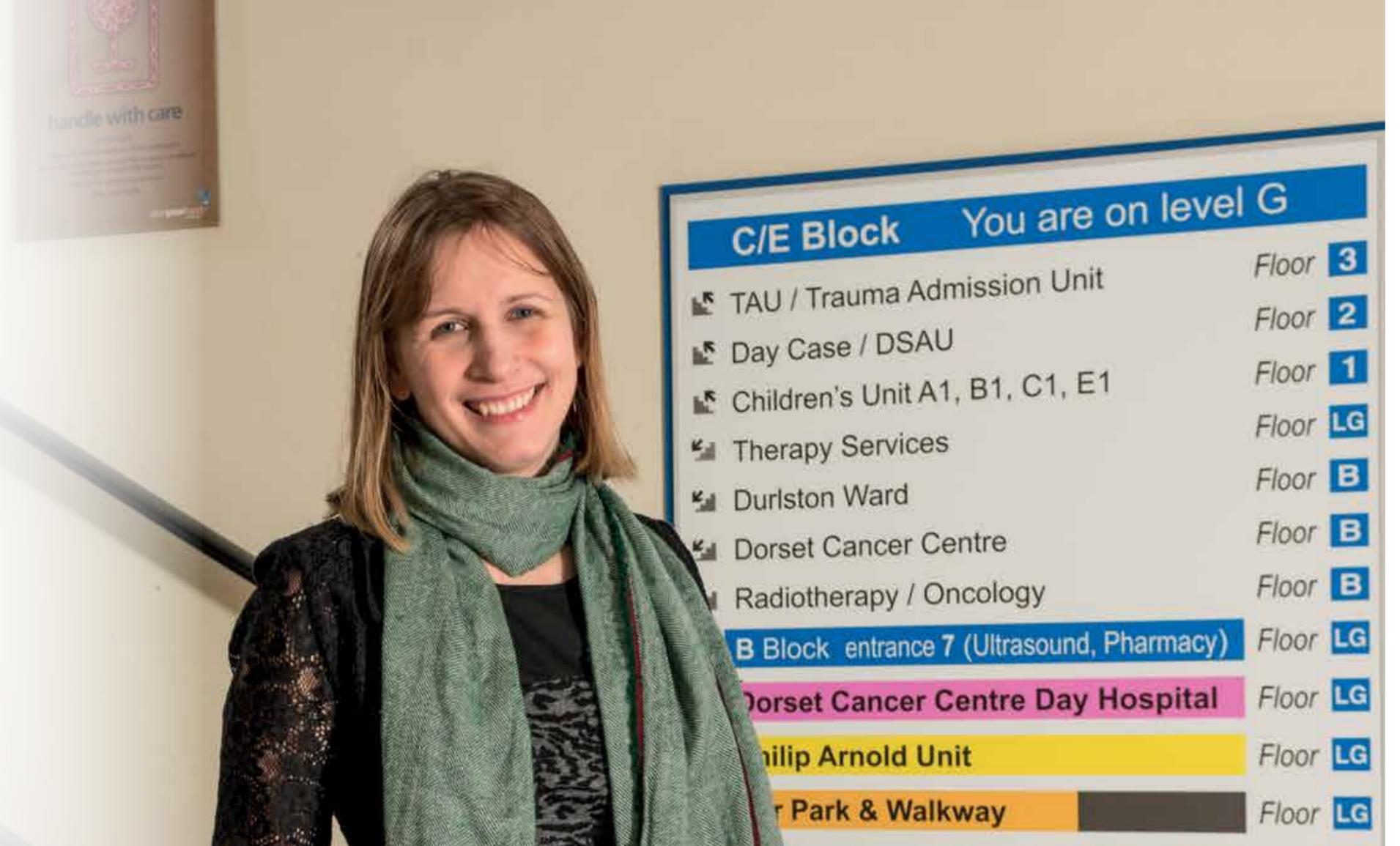
Kmecova's recommendations were put into place in one location first and the results were immediate. 98% of people could plan their route effectively, and significant improvements were also observed in how quickly they planned their route. Further signs were put up in May 2013.

"I was continually aware of the difficulties people have finding their way round these complex buildings."

Following this phenomenal success, Kmecova is now working with Frimley Park Hospital in Surrey to transform their signage. "At the moment I'm poring over floor plans," she says. "I'm analysing the current wayfinding support, identifying all the walkable areas and defining decision points. Routes to departments and services need to be planned to suit the capacity of each corridor, and traffic caused by equipment and material transfer. This is important to avoid crowding and clashes.

It is clear this research has the potential for wide reaching application across the NHS. Perhaps most importantly though, it has contributed significantly to the WRC establishing an effective, research-based solution to wayfinding problems, which replaces existing, unreliable navigational supports, typically based on intuition and guesswork.

Other researchers in the group have conducted similar studies in the international Frankfurt airport (FRAPORT, Germany) and the World Heritage Site of the Old Royal Naval College, Greenwich. [BRC](#)



19

# Falls prevention

Reducing the risk of falls by motivating older people to do preventative exercise

Every year, a third of people over 65 living in the UK will experience a fall.

This not only causes considerable emotional distress and physical harm, but also costs an already over-stretched health system over £1 billion each year.

Simple strength and balance training can effectively help to prevent falls, but BU research shows only a minority of older people will carry out these exercises.

Dr Samuel Nyman has studied how best to motivate those at risk of falling to actually complete the exercises, as well as raising awareness of the importance of regular strength and balance training.

“Falling is a massive and complex issue. It has lots of risk factors and there is not just one solution,” says Dr Nyman, a Senior Lecturer in Psychology, who has been working with both health professionals and older people themselves.

“It is an issue for people of an older age because their reaction times are slower, so they are less likely to stop themselves. The consequences are also far greater too – falls are more likely to result in fractures, which are one of the main triggers for going into a care home.”

Falls in those aged 65 or above account for over 50 per cent of injury-related hospital admissions, and 40 per cent of all injury-related deaths. This has a significant economic impact on the NHS, with costs of ambulance callouts and increased social care assistance following a fall. But Dr Nyman explains there can be seriously detrimental psychological effects as well.

“If people develop a fear of falling again, then they reduce their activity, they don’t go out as much and this relates to people becoming socially isolated and feeling lonely.”

Evidence shows that strength and balance training is the most effective way to prevent falls among older people living in the community.

Recommended exercises can range from tai chi classes to simple home-based techniques, like standing on one leg while doing the washing up.

“It’s all about promoting the positives, not talking about falls at all.”

Two key reviews by Dr Nyman, which looked at data from existing trials into falls prevention, found only around 30 to 42 per cent of older people in the community are likely to follow interventions like strength and balance training over a 12-month period.

“There is robust evidence that strength and balance training is really effective,” Dr Nyman says. “As long as you can get people to start doing it and maintain it, there is about a 30 per cent fall risk reduction, alongside benefits like meeting up with other people and socialising.”

“But it’s not just about giving people the information – we need to see what works and what might prevent people from taking up the exercises.”

Dr Nyman’s work has been used to educate health professionals working with older people, through a training course, an online resource, and a new evidence-based website [www.freshbalance.org.uk](http://www.freshbalance.org.uk), which provides advice on the best forms of exercise to prevent falls.

The site applies Dr Nyman’s research to ensure the information is presented in the most appealing way to motivate older people to carry out the exercises.

“The evidence at the moment would say that it’s all about promoting the positives, not talking about falls at all,” he says. “It’s also about choosing exercises that are going to be suitable for them, that they will enjoy and are relevant to their age group – someone who is 65 will have very different wants and needs to someone who is 85.”

Dr Nyman has also co-founded and chairs the Dorset Alliance to Prevent falls and Promote independence (Dorset APP), which brings together several local organisations to work more effectively to prevent falls, including hospital representatives, council services, voluntary organisations, and older people. He now plans to work with the Bournemouth University Dementia Institute (BUDI) to look at preventing falls among older people with dementia.

“We now have a fair sense of what we need to do to prevent falls generally with older people, but not people with dementia, who might have slightly different needs,” he said.

“We know people with dementia are more at risk of falling but we want to look at the specific reasons why, and how we can best help them. BRC”

# Entrepreneurship & Economic Growth: BU impact

BU economics and tax law research has been applied to government policies across the globe

## Turks and Caicos

Richard Teather's research into the knock-on effects of VAT was applied to assess the impact it would have on the Turks and Caicos Islands. Following Teather's advice that VAT was unsuitable for this unique economy, and that the implementation date was too soon for the government or businesses to prepare, the proposed plans did not go ahead.

## Jersey

Richard Teather's tax law research has been applied by the Government of Jersey to implement the island's first ever VAT, known as goods and services tax (GST). This now raises £80 million per year to fund public services, which is 13% of Jersey's total tax revenues. The research was also applied to develop the Island's new system of corporate income tax.

## Gibraltar

The UK Government and the Government of Gibraltar have used economic models developed by Professor John Fletcher to determine the impact of changes such as the closure of HMS Dockyard, the closure of the Royal Naval Hospital, the development of Gibraltar Ship Repair, the opening of the frontier with Spain, the operation of off-shore economic activities, and the management of its online gaming industry.

## Azerbaijan

Professor Allan Webster has conducted research into competitiveness in international trade and attracting inward foreign direct investment, as well as identifying how taxes and other government policies affect this underlying competitiveness. This has been used to strengthen the research capabilities of the Institute for Scientific Research on Economic Reforms, Azerbaijan. This has been integral in the successful development of new, internationally competitive industries and the World Bank naming Azerbaijan one of the top ten economic reformers.

## Namibia

Professor Webster's research has been applied to safeguard essential revenue for Namibia. Following his report, proposals to re-allocate funds worth US \$300-400 million each year were scrapped. This amount is equivalent to around 13% of Namibia's national budget.



Research engineer Karsten Pedersen at web agency Amuzo

## Centre for Digital Entertainment

Researchers in the NCCA's Centre for Digital Entertainment (CDE) are applying academic research to a range of industry problems

Nowadays computer gamers use an increasing range of mobile and tablet technology, with the expectation that games will work efficiently across all hardware. But developing software for cross-platform deployment is a complex and lengthy process.

Karsten Pedersen's research examines how to reduce production costs, whilst outputting optimised products on each platform. This is achieved through 'platform agnostic coding'.

Pedersen explains: "Different platforms provide different features, require different programming languages and so on. I'm trying to develop a method to target all of these at once, without just building to suit the lowest common denominator. This will mean games designers don't have to produce bespoke code for each device. I'm currently doing this by developing a portable architecture for our games whilst making good use of data driven development, resulting in a higher level of abstraction than raw code can provide. There has been specific focus on the flow of our games and how it can interact seamlessly with the native platform."

Pedersen's work, supervised by Dr Christos Gatzidis, is just one example of the 50 research projects currently taking place in the CDE, across animation, games and visual effects industries.

The CDE is an Industrial Doctorate Centre within BU's National Centre for Computer Animation (NCCA). It is a collaboration with the University of Bath and funded by the Engineering and Physical Sciences Research Council (EPSRC) under the Digital Economy Initiative. At its core is the aim to dissolve the barriers between academia and industry.

The BU Centre Director, Professor Jian Zhang says: "The CDE is creating the technology leaders of tomorrow through sound academic grounding in research skills, within the context of the real drives and pressures of industry. Our research has a relevance and immediate impact because it is being developed with the companies who are best placed to exploit it."

Each research engineer has an academic supervisor and an industry mentor, spending 75% of their time in industry. In Pedersen's case this time is spent with the web agency Amuzo, who specialise in developing online games for children. The work has had an immediate impact, already used in Amuzo's latest releases. These include the *Wizards and Aliens* game, which was the most popular content on the CBBC website for three weeks running, and Lego's *The Yoda Chronicles*,

which smashed Lego's record for installs on iOS during launch week.

Despite its name though, CDE research and development is not exclusively for the entertainment industry. They also bring the benefits of digital visualisation technologies to healthcare, heritage and other sectors. One such project is looking at serious applications of video games technology.

"Video games have provided users ways and means to work and move around in a 3D space," explains research engineer Wayne Young. "The industry is continuing to innovate with new control devices and display technologies. Video games and air traffic management both present challenges to the user that are three-dimensional in nature. Other industries, are beginning to realise the benefits of the technology as the field of Serious Gaming develops. It's my goal to prove that these technologies can be adapted to meet the needs and requirements of the air traffic management industry."

"Creating the technology leaders of tomorrow through sound academic grounding in research skills, within the context of the real drives and pressures of industry."

Currently companies invest heavily in bespoke 3D technology, often with costly and restrictive licensing deals. Working specifically with the air traffic movement consultancy Think Research Ltd, it is hoped Young's research will allow them to use lower cost and better quality technology.

This is an excellent example of how industries can benefit from the CDE. "For companies this is a low-cost, low risk way to enhance their capacity and develop products and process for the future," explains Professor Zhang.

"It's not just great for the industry though," he continues. "For the university it is a pathway to apply our research under real world constraints and for the student it is a unique learning experience and opportunity to make a genuine contribution to their host organisation and to academia." BRC

# Digital destinations

Through £188,000 of funded research, BU's Dr Philip Alford is uncovering why small tourism organisations have not yet fulfilled their digital marketing potential and is refining techniques to reverse this trend

26

A fear of new technology is still a significant factor inhibiting small tourism businesses from embracing digital marketing. Largely family run, these organisations may lack the expertise, experience and training opportunities that larger businesses benefit from. But they are undoubtedly missing out.

BU's Dr Philip Alford says: "Digital marketing offers small tourism businesses a level playing field on which they can compete effectively with larger organisations through

targeting a wider audience, promoting their unique offer online and selling through multiple channels."

Known as small and micro tourism enterprises (SMTEs), these businesses include anything from bed and breakfasts and holiday homes to small visitor attractions like working farms and museums.

Through collaborative research with regional tourism organisations such as Poole Tourism, VisitWiltshire and Farm Stay UK among others, Dr Alford has gained in depth insights into SMTE practice and the challenges they face.

Besides limits on time, funding and, in some cases, a fear of new technology, his research uncovered that many owners do not have access to their own content management system. This means they are unable to update the company website themselves, resorting to the costly and lengthy process of using the freelancer or agency who developed the site.

Insights into how SMTEs use social media and email lists were also telling. Most had an ad hoc approach at best, coupled with a lack of resources or understanding of how to track and measure their digital marketing efforts.

These research findings underpinned a series of workshops facilitated by Dr Alford. With a strong marketing rather than technology focus, sessions emphasised the importance of having a digital marketing strategy with clear key performance indicators (KPIs) such as the ratio of repeat versus new visitors, the number of pages visited (page depth) and sales conversion tracking.

Five organisations commissioned a new content management system website and two developed an email marketing strategy after attending the workshop. Among them is Cari Sorby, owner of Manor Farm bed and breakfast in Dorset.

"Since the installation of the new website and my increased level of knowledge of online marketing I have had an increase in enquiries and bookings. I receive compliments about my website, with guests saying how clear it is with good photos, an easy to read layout and additional information and links that are great for people planning a visit to Dorset," she explains.

Dr Alford's latest 'Digital Destinations' project is extending the impact of his work further. Funded by the Economic and Social Research Council (ESRC), Alford has recruited 60 businesses to participate in the project. The organisations include hotels, self-catering accommodation, arts and culture centres, watersports and activity operators among others. Each company is partnered with a final year student to develop digital marketing plans.

The team has gathered a range of qualitative and quantitative data from the 60 businesses and are analysing it to identify the challenges and opportunities for SMTEs engaging with digital marketing.

**"Effective digital marketing can have an immediate and measurable impact on small business performance"**

One of the companies taking part in the project is Bennetts Water Gardens. This beautiful eight acre site of wetlands and woodland is a vibrant home to plants and wildlife. It provides a tranquil and relaxing experience for visitors. Since the Digital Destinations project, owner James Bennett has witnessed a 5.5% increase in

web traffic compared to the same period the previous year.

Other organisations have introduced new digital marketing tools and channels, evaluated activity through social media management platforms and developed KPIs to measure activity further.

"Effective digital marketing can have an immediate and measurable impact on small business performance," concludes Dr Alford. "As the findings are disseminated through journals, conferences and a final networking event, it's hoped this impact will increase further, with more organisations benefiting from this research." BRC

27

# Ecological restoration

Putting a price on clean water and soil fertility helps the UN set ecological restoration targets for degraded and deforested land

28

Forests provide essential ecosystem services for people, including timber, food and water. For those struggling with the after-effects of deforestation, the main hope lies in rebuilding forest resources through ecological restoration.

Researchers at BU have shown that placing a monetary value on ecosystem services provides a mechanism for evaluating the costs and benefits of reforestation activity.

“Ecological restoration initiatives are being undertaken around the world, attracting billions of dollars of investment annually,” explains Professor Adrian Newton.

“They make a significant contribution to sustainable development but few attempts have been made to systematically evaluate their effectiveness.”

To address this knowledge gap, Professor Newton and fellow BU researchers analysed 89 different types of restored ecosystem sites across the world. The results showed that, although restored land was not as productive as land that had not been degraded, restoration efforts increased biodiversity by 44% and provision of ecosystem services by 25%.

“This initiative directly employs the Forest Landscape Restoration approach that we researched, developed, tested and refined.”

What’s unique about Professor Newton’s research is that it also provides one of the first evidence-based assessments of how cost-effective ecological restoration initiatives are.

Professor Newton developed this method as part of the ReForLan research project in the dryland forests of Latin America, which brought together researchers from six countries to assess the environmental degradation and the potential for ecological recovery through restoration. The methodology assigns financial value to

ecosystem services, such as the provision of clean water, carbon storage and soil fertility that would result from restoration, showing how cost effective these efforts are.

He says, “This was undertaken by analysing the value of the increased provision of ecosystem services that could potentially be provided as a result of ecological restoration actions.”

So successful is the methodology that it was used to inform the United Nations Environment Programme’s restoration targets and specifically ‘Target 15’ of the Aichi Biodiversity Targets to restore 15% of the world’s degraded ecosystems by 2020. The UN say these targets can be achieved through Forest Landscape Restoration, which is an approach developed, tested and refined by Professor Newton during the ReForLan project.

“We examined how Forest Landscape Restoration may be implemented in practice, and evaluated the cost effectiveness of this approach and its benefit to human communities,” he explains.

Professor Newton has demonstrated that at the heart of successful forest landscape restoration is a flexible and adaptive approach. It should allow communities to participate in the decision-making process, and enhance ecosystem service provision for those living within them.

The Forest Landscape Restoration method has been heralded as the solution to restoring 150 million acres of degraded and deforested land. This target is part of a global movement, known as ‘Bonn Challenge’, named after its inception in Bonn, Germany in 2011. Individual countries have so far committed to restoring 50 million hectares of forest, a significant step towards achieving the policy goals.

“This initiative directly employs the Forest Landscape Restoration approach that we researched, developed, tested and refined,” says Professor Newton.

“Ecosystems are a rich source of biodiversity and the services they provide are relied upon by local people. The approach developed through the ReForLan project allows policy makers to identify locations where ecological restoration is most likely to be cost effective.” BBC

29

# Animation in Africa

A counter narrative to animation in Western popular culture

30

Animation in Africa breaks many stereotypes and preconceptions. It is not all about the 'exotic'. The films can be political and often subversive offering new windows into representations of Africa. The technology used can range from the inventive to the very advanced. The representations of Africa we tend to see on mainstream media in the West offer a particular snapshot that serves to embed further the misconceptions of animation in Africa.

A chance conversation between Paula Callus, who had just started lecturing at BU's National Centre for Computer Animation (NCCA), and an animation student from Ghana, Samuel Quartey, led her to pursue her research in animation from Africa.

"We talked about visual metaphors in cinematography and the cultural significance of these," she explains. "A typical image sequence to represent time passing may be a tree going through the transitions of four season changes. But in Ghana these four distinct changes do not happen, so this meaning is specific to the West. I realised how little we knew about animation in Ghana, and indeed in Africa in general, so I thought, wouldn't it be brilliant to find out more?"

Paula found that the literature within animation studies was limited to accounts of animation in Europe, or the US and that Africa was largely under-researched. As a result, she is now setting about documenting how animation is used, its various histories and exploring the power that it has on the African continent.

"Animation in Africa is a very exciting form that is only just being discovered now", she says. "If we don't record its existence and developments, they will disappear in time."

Paula worked for a Swedish TV company on motion graphics before coming to BU to do her Masters. "I came for one reason," she explains. "I would be studying at the NCCA."

United Nations Educational, Scientific and Cultural Organisation (UNESCO) saw a short description of her work on the NCCA website and contacted Paula. She was invited to join a team of consultants developing a five-week training residency, known as the Africa Animated project.

"I became an animation trainer on a five-week residential course in Zanzibar and Nairobi. This was a fantastic opportunity as I could learn so much whilst I was teaching."



31

The program ran for four years across different African countries with applicants from a range of Sub-Saharan countries. Those trained have since gone on to work on a diverse range of animated projects, including international productions like the animated series *Tinga Tinga Tales*, feature length 3D animations like *Zambezia* in South Africa, and the local political television series *The XYZ Show* in Kenya. Independent short films have been screened at international festivals, including Africa in Motion, Edinburgh and the New York African Film Festival.

One of the recent themes Paula's research has picked up on is how animation in Africa is used to get across subversive messages through subtle uses of metaphor, parody, and humour. "Animation is seen typically as something for children, appearing harmless and unsophisticated, yet this very fact allows an artist to hide very strong political messages behind this veil of innocence. This is what gives it power."

Paula says the introduction of the internet and digital technology is having a fantastic effect on the development of the animation industry in Africa, both for making films and for democratising their distribution. "Many animators are using their mobile phones to make films and distribute them. This is making the industry much more reactive to events going on and giving it an edge."

"I became an animation trainer on a five-week residential course in Zanzibar and Nairobi. This was a fantastic opportunity as I could learn so much whilst I was teaching."

"Animation in Africa is not a homogenous genre of filmmaking. Each country on the African continent has a specific set of social, political and economic conditions that are unique to it. For these reasons the variety of style, content and techniques range accordingly. This assortment makes for a fascinating collection of artistic practices that on some occasions move beyond the work of an auteur towards the start of a fledgling industry.

"My research aims to offer a counter narrative to the dominant discourses we find on Disney and other global players that have dominated Western popular culture and similarly dominated academic discussion in this field. It seeks to readdress the balance by drawing attention to the variety of artistic forms and practices that stem from different African countries and that can provide a window into the cultures that inform it." BRC



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