Highlights from heat@uwe

Bridging the gaps in health, environment and technology research

June 2012

Highlights from the heat@uwe programme

heat@uwe is an Engineering and Physical Sciences Research Council (EPSRC)-funded programme of activities to develop, facilitate and communicate interdisciplinary research between health, environment and/or technology. It is a collaboration between colleagues in the Institute for Sustainability Health and Environment (ISHE) and those in the Departments of Computer Science and Creative Technologies, and Engineering Design and Mathematics. This three year programme received £548K of funding from the EPSRC Bridging the Gaps initiative and started in 2009. heat@uwe is led by Prof. Katie Williams, managed by Dr Danielle Sinnett and steered by an active management team of Co-investigators and research managers representing public and clinical health, built environment, environmental science, computer science, social marketing, science communication and RBI.

heat@uwe objectives

The heat@uwe management team identified the following objectives for the programme:
- To enable and sustain collaboration across health, environment and technology
- To use heat@uwe to generate external funding
- To strengthen our relationships with existing external partners and to forge new collaborations
- To embed interdisciplinary working across health, environment and technology
- To develop a long term capacity at UWE for interdisciplinary research
- To disseminate heat@uwe research.

heat@uwe successes

heat@uwe has been a very successful programme and has achieved positive outcomes in a relatively short period of time. The programme is now well established and recognised for its achievements across UWE. The management team has actively monitored the outcomes of the programme against its objectives and can report the following:

- The **reach of the programme has been far wider** than anticipated, initially the aim was to facilitate collaboration between ISHE and Departments of Computer Science and Creative Technologies, and Engineering Design and Mathematics, however the heat@uwe network has **203 members of UWE staff spanning all four faculties** and thirteen departments. This represents around **half of the research active staff at UWE** (those reporting spending more than 20% of their time on research in the Transparent Approach to Costings data).
- We have run **20 events in 30 months** targeted at different audiences attended by a total of **181 members (90%)** of the network. These have included a **'Visioning Conference'** and a **'Hot House'** which were large annual events to develop research ideas and 'Heating up' seminars to communicate the breadth of research underway at UWE in **geographical information systems**, **health impact assessment**, **flooding**, **food** and **behaviour change**. We have also run three **Lecture and Lunch** series covering a range of interdisciplinary research areas and our Start-up projects as well as workshops focussed on specific funding calls.
- heat@uwe has awarded **£130k of Start-up funding** to **18 interdisciplinary projects involving 72 UWE academics**. This has enabled these staff to gain experience, in some case for the first time, of interdisciplinary research (see following showcase of projects).

- heat@uwe's activities have resulted in bids to **Committee for Climate Change**, **EPSRC**, **Arts and Humanities Research Council**, **Department for Environment, Food and Rural Affairs**, **European Union** and **Pain Relief Foundation**. These have come from new collaborations in the university, enabled through networking events and Start-up funding. They have also involved 17 external partners including **Bristol City Council**, **Soil Association**, **At-Bristol**, **Royal National Hospital for Rheumatic Diseases**, **White Design**, **Centre for Environmental Research (Germany)**, **National Space Research and Development Agency** (Nigeria), **Carnegie Mellon University** (US).

The **following testimonials** give an indication of the value of the programme in terms of capacity building, culture change and the development of interdisciplinary research:

"the project has gone amazingly well and the sensor we've developed could be patentable. It's enabled some adventurous research to be undertaken, which we would have had difficulty in finding funding for [a diagnostic aid for detecting urinary tract infections]."
(A Professor in Analytical and Sensor Sciences)

"The heat@uwe scheme allowed us to realise the talent in other faculties and develop projects that would otherwise have remained items on a wish list."
(An SRF in Allied Health Professions)

"heat@uwe has provided me the opportunity to meet and work with members of staff from within my Department as well as across the University. As a result of working on these pilot projects, we have put together significant research bids and have developed valuable working relationships that we aim to continue in the future… HEAT genuinely has opened doors for me."
(An SL in Planning and Architecture)

"We would have not started working together without the heat@uwe funding. It was a true bridging of the gaps."
(A Reader in Engineering Design and Mathematics)

"This interdisciplinary project would never have got off the ground without this funding – I've been trying for 15 years, more so this funding helped us make links with external collaborators."
(An Associate Professor in Applied Sciences)

"We've always known that there is a causal link between air pollution and health, but working with other colleagues on this project has improved our knowledge and how we research the link."
(An RA in Geography and Environmental Management)

"The heat funding has been really useful to me: it has allowed me to work with completely new collaborators from different faculties, try out new research ideas on a manageable scale and develop my own skills as an early career researcher."
(An RF in Applied Sciences)

"We had reached the point in our project where we just needed a small amount of funding to move it to the level of an external grant application and HEAT funds filled that gap. We had been unable to find any other similar small grant fund that was appropriate. Now having secured that external grant, a new therapeutic device is under way. Without HEAT I cannot see how we could have progressed to this point."
(A Professor in Nursing and Midwifery)

"The HEAT funding has helped our team to develop a research profile in the emerging area of Health (mobiles for health). We have successfully combined a user-centred approach to mobile interaction design with an underlying evidence-based clinical model. The signs all point to this continuing to provide a rich seam of ideas for future work and for ongoing collaboration between health and technology faculties."
(An SL in Computer Science and Creative Technologies)

heat@uwe highlights

The following gives an overview of the main highlights from heat@uwe in the last six months:

- **Collaborative research papers**, for example the 'Public transport pervasive gaming' team have had a paper accepted for publication in Communications in Mobile Computing.
- **Presentations at international conferences**, for example the 'Development and evaluation of a tool for assessing body image' team **presented a paper** at Inter-Society for the Electronic Arts conference.
- **Securing further funding**, for example the 'Development of an Electrical Sensory Discrimination Therapies (ESDT) device for the relief of chronic pain in Complex Regional Pain Syndrome' team have secured additional funding (£18k) from the Pain Relief Foundation to take their device into proof of concept testing.
- **Developing staff**, for example two early career researchers have submitted a bid to AHRC from their project 'Facilitating healthy sustainable behaviours through home design' as well as exhibiting their timelines at the Architecture Centre.
- **Building new collaborations**, for example a team of new and established staff at UWE have used Start-up funding to submit an Expression of Interest (with new external partners) for a European Union Cost Action on 'Supporting community actions as an effective response to flood risk'.
- **Building institutional expertise in interdisciplinary research**, for example the heat@uwe management team authored a 'Best Practice Guidance for Interdisciplinary Research' report for EPSRC (which was distributed to all holders of BTG funding), presented their experiences of the programme at conferences, and submitted a research article on undertaking interdisciplinary research to Research Policy.

The future of heat@uwe

Ultimately heat@uwe aims to sustain the culture of interdisciplinary research across health, environment and technology at UWE. To achieve this and build on the momentum already built up through the EPSRC funding the management team propose that the following, most successful, aspects of heat@uwe are retained through support from UWE:

- Collaboration brokering: This includes identifying potential collaborators using the heat expertise directory, organising and facilitating workshops to explore potential project ideas.
- Heating up events: These half day events focused on a specific 'hot' topic allow research expertise to be shared through a series of 'rapid fire' presentations followed by an exploration of future research.
- Start-up funding: This is awarded on an annual basis to interdisciplinary projects to allow teams to position themselves to apply for further funding.

Management Team: Professor Katie Williams, Professor Jim Longhurst, Professor Selena Gray, Professor Judy Orme, Professor Larry Bull, Professor Alan Tapp, Professor Richard McClatchey, Dr Zaheer Khan and Dr Sandra Spencer.

Mapping behaviour change policy, theory and practice

Current political and theoretical rhetoric tends to champion behaviour change as a method for altering public and individual behaviour for the better. However, what constitutes behaviour change in terms of theory and practice is not easy to define.

This project aims to map current thinking and trends in behaviour change by identifying success stories, champions, protagonists, thinking and debates. The findings suggest that both hard and soft measures can be successful behaviour change interventions, that there is a greater need to understand behaviour change in terms of socio-political context, and that a move towards a more transdisciplinary model of behaviour change is needed.

Purpose and context

The project addresses the following key questions:

- What are the key trends and developments in behaviour change approaches (e.g. behavioural economics)?

- Which research areas are attracting funding from major funders (e.g. obesity, transdisciplinary research, research into habits formation, automaticity, etc)?

- What are the government's behaviour change priorities, in terms of techniques, approaches and target behaviours?

- What direction will behaviour change research and practice take in coming years?

- What is the latest thinking on behaviour change mechanisms/approaches, e.g. What are considered to be the most successful approaches or combination of approaches?

Methods

A comprehensive literature review was coupled with interviews with key behaviour change theorists to generate knowledge on current thinking and debates. Trends in the theory and application of behaviour change were identified through reviews of research funding and grants awarded to behaviour change topics.

Results and outcomes

Behaviour change continues to be a key area in policy,

practice and theory, especially with regards to the contexts of citizenship, health and the environment. The research to date has been able to categorise behaviour change into soft and hard measures.

Soft measures involve social marketing and segmentation approaches, in particular education, information and knowledge deficit and provision but also challenging social norms, encouraging reflection, commitment and pledging, and the importance of co-creating solutions. Hard measures involve legislation, enforcement and economics.

Such solutions need to understand the psychological perspective surrounding their deployment in order to achieve successful behaviour change. The role of technology in supporting these approaches is also crucial in managing behaviour change. A number of theories bring together key components of soft and hard approaches including the transdisciplinary approach.

There is a need for:

- more ideological debate about behaviour in general

- a better understanding of the populations under scrutiny

- an understanding of the socio-political context within which change occurs

- a move towards a true transdisciplinary approach rather than the interdisciplinary or multidisciplinary approaches that currently dominate.

Contact details

Student + bike = better together: motivating cycling through positive experience

This research followed a group of novice cyclists who were provided with the opportunity to experience a transition from being non-cyclists to cyclists. The project simultaneously examined personal attitudes and perceptions and physical and physiological realities in an attempt to reveal the associations between the multiple factors affecting behaviour change.
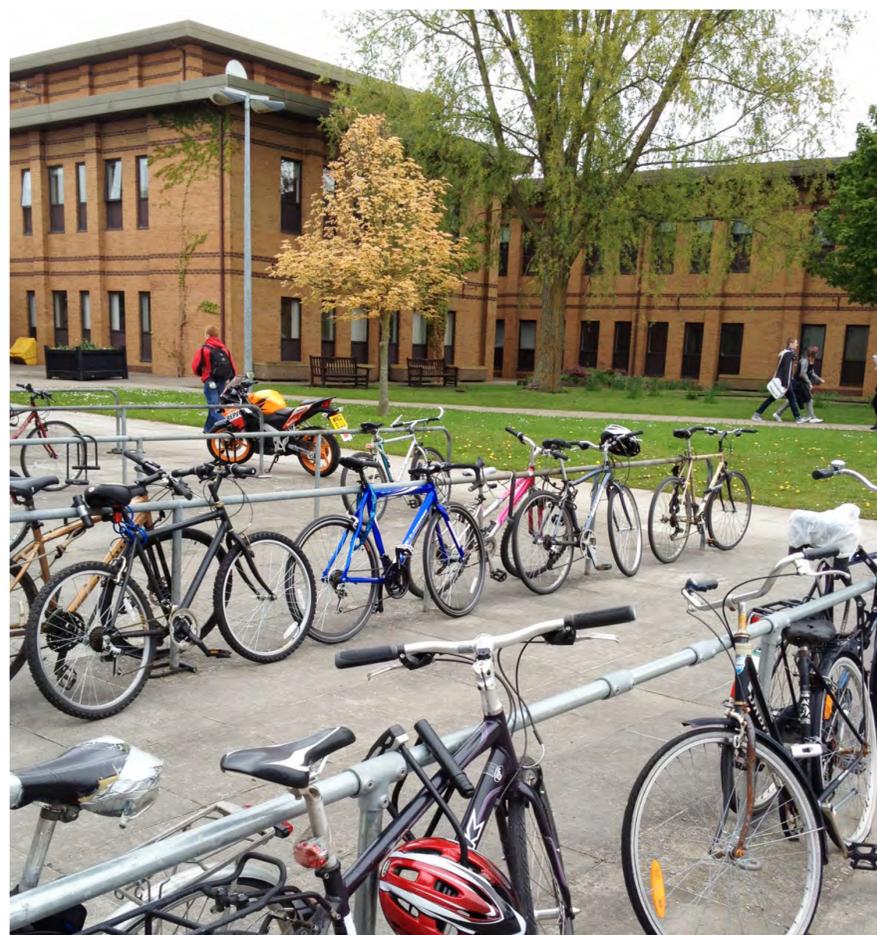
Context

On average, 62% of trips in the UK are 5 miles or less with more than 80% of those being undertaken by car. This suggests there is scope for increasing the number of short cycle journeys which can be highly beneficial for both environmental and personal health reasons. However, individual behaviour is the result of complex interactions which makes changing behaviour challenging. Using cycling as the focus, this interdisciplinary, mixed methods field study attempted to compare subjective perceptions with objective physical and physiological measures and to understand the role of positive (i.e. real) experience on attitude changes and health benefits.

Methods

The study employed focus groups, social networking, GPS route tracking, and monitoring of health data. These methods were used to explore how subjective perceptions and attitudes towards cycling and environmental perceptions change over time in response to a novel, supported experience. Perceptions and attitudes were compared to objective measures such as distances travelled, inclines covered, weather experienced and changes in key health measures such as blood pressure, heart rate, weight, and lung capacity.

The study was undertaken in the first term of the 2011-12 academic year (September to December) with a follow-up survey carried out in March 2012. UWE students were recruited according to a number of inclusion criteria (live 3-5 miles from UWE, currently do not cycle to UWE and are ambivalent about cycling as a realistic travel alternative) and potential participants were screened using a simple questionnaire. Selected participants were provided with start-up resources including the free loan of a bike for the duration of the project, basic safe cycling and maintenance skills, route planners and social networking possibilities.

'Before and after' health check-ups were conducted along with focus groups to acquire data on physical changes and attitudes, and to relate cycling frequency with health improvements. Throughout the study participants' cycling movements were tracked with GPS loggers (attached to the bike), enabling comparisons of physical attributes of chosen routes (such as location, distance travelled, incline) to perceived experiences and physiological changes. All participants who remained in the study, regardless of the degree of participation, were entered into a prize draw for a quality bike.

Analysis of results is currently underway. Whilst the project recruited and retained fewer participants than anticipated, the project is expected to provide a valuable insight into the perceptions of non-cyclists and how behaviours and attitudes are open to change through the experience of cycling.

Contact details

Project lead:
Eran Ben-Elia
Faculties:
Faculty of Environment and Technology, Faculty of Health and Life Sciences
Project team:
Eran Ben-Elia, Sarah Burgess, Saad Liaquat Kiani, Michael Horswell, Helen Featherstone, Karina Stewart.
Contact details:
sarah2.burgess@uwe.ac.uk
Funder and programme:
HEAT@UWE
Timescale:
June 2011 - June 2012

Pervasive gaming on public transport

Digital games have the potential for changing attitudes towards social issues such as climate change and sustainability. The aim of this project is to deliver a working, proof of concept, pervasive game that would itself be themed around transport and sustainability and intended to be played on public transport.

Purpose and context

Current research questions

- How can we make use of contextual data gathered on public transport, via mobile devices?

- What are the affordances and constraints for game design on public transport?

- How can the 'Layar' Augmented Reality Browser be used as a game delivery platform?

Future project research directions

- How can we use pervasive and ambient gameplay techniques to make a public transport journey more fun and engaging?

- How can we create an experience that embeds an understanding of the systemic nature of sustainability and transport issues?

Method

This was a proof of concept, location-based, augmented reality (AR) game played on smart phones.

In AR Plots the players 'grew' plants alongside bus routes. Virtual gardens are established by bus stops and traffic lights as, when the bus stops for a length of time, empty plots are created that players can plant in. A player can plant a seed in a plot and will 'own' it with their plant. Plants need watering and players can water their own and other people's plots. In addition, plants will only bear fruit or flowers if other players also water them. However, the amount of water they have is very limited.
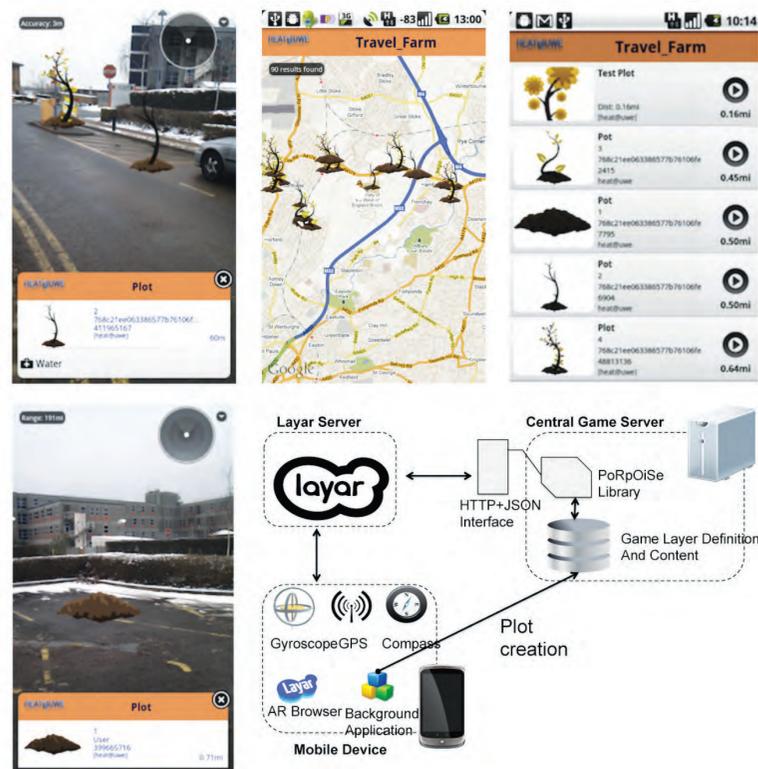
The game world is run from a web server using the scripting language PHP and a MySQL database. The player interface is run on Android smart phones, using a background service and the Layar AR browser

Issues

The following issues were encountered:

- Motion sickness whilst using an AR browser

  All participants reported a feeling of motion sickness. This included those who said that they didn't normally feel motion sick whilst reading or using devices in cars or public transport.

- Social issues of camera use in public transport

  People in front of the camera are very aware of being photographed or filmed.

- Device and interface issues

  Particular issues faced are, firstly, the variability of lighting conditions, and secondly, the relationship between GPS data and the application.

Recommendations for future development:

- Seamful Design

  This involves designing the application to fit the inevitable problems such as sensor unreliability and connectivity loss. This will allow us to deal with the technical and device constraints rather than try to overcome them.

- Simple Interaction Mechanics

  The interaction with the game is designed to be very simple because the game is intended to be ambient (i.e. it runs in the background and does not require constant attention), and not distract from other activities on the bus, or simply the enjoyment of the journey.

BeCAUSE: Behaviour Change and Agriculture in Urban Society and Environments

Food production in towns and cities offers the potential to overcome current and future challenges associated with food security, energy use and the changing climate. BeCAUSE will assess how urban agriculture is being adopted in Bristol and produce insights into the barriers, risks and opportunities encountered by community groups.

Purpose and context

Growing your own food has been highlighted by Defra as one of the key indicators of a sustainable lifestyle (Defra, 2011). Previous research on urban agriculture has focussed on the health benefits, governance and community cohesion. However, the availability of good quality land for cultivation and tensions between land uses means that sites are considered for food production where the conditions may not be suitable without some form of intervention. BeCAUSE is pilot project which aims to determine the barriers and challenges of urban agriculture in Bristol, and how this behaviour could be further supported with improved knowledge communication.

Method

In the past urban agriculture has generally been confined to private gardens, allotments and city farms. However the problems of climate change and fuel/food security have led to a revaluing of urban spaces and their potential as a resource for food production. This is particularly true in Bristol, which has a well established food network, and an increasing number of community urban agriculture projects. These projects range from community garden schemes which lease green belt land from the local authority to community farms and guerilla gardening schemes, which squat on or acquire derelict or underused land to produce food.

The success of these projects is varied and often dependent on the knowledge of individuals, availability of information on appropriate agricultural methods and access to safe and secure land.

In addition, there is a wide range of information sources and guidance that an urban agriculturalist can draw upon (e.g. through networks such as guerillagardening.org). However there is less information on elements such as safe use of land for food production in urban soils that may have been negatively impacted on by previous or surrounding land uses. Similarly, the academic literature focuses on community engagement, social equity and healthy eating and lifestyles with only limited research on the safe use of land for ad-hoc food production.

BeCAUSE uses a socio-technical approach to examine the barriers, risks and opportunities encountered by different stakeholders involved with urban agriculture. Semi-structured interviews, informed by an extensive literature review will be undertaken with representatives of the urban agricultural movement. This will enable the project to develop an understanding of the practical challenges of urban agriculture in Bristol. In addition, the interviews will be used to examine the communication and enabling mechanisms utilised by these groups.

The outcome of this project is a comparison of the experiences of urban agriculturists, and an analysis of how lessons and guidance are passed between the groups.

Space in the sustainable healthy home

This study investigates the impact of policy, society and technology on the design of homes in the United Kingdom over the last one hundred years and how the design of these houses can accommodate current and future sustainable lifestyles.
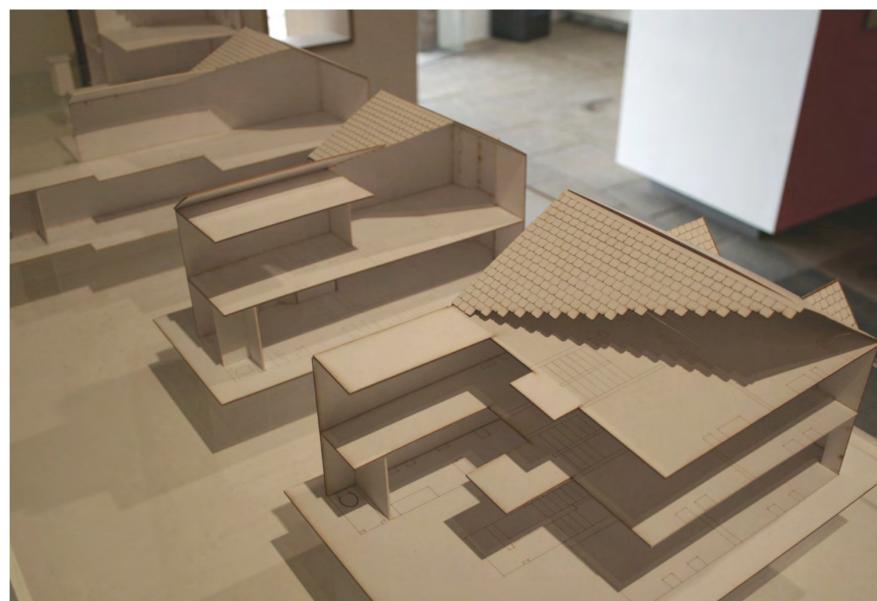
Context

New homes being built in the United Kingdom today have been criticised for not providing space for basic living functions. We now have the smallest homes in Europe with very little storage space and small, multi-purpose rooms. So what impact will this have on our future behaviours in the home?

There is a clear symbiosis between the neighbourhood, the home and the individual. In order for people to lead healthy and sustainable lifestyles they need to have the facilities and space provided in their environment at both the neighbourhood scale and that of the home.

At a time of aging population, an increase in single-person households and a growing move towards home-working, understanding the influences that shape our built environment and behaviour is crucial. This project explores the major changes in our housing over the last hundred years and identifies social, economic, technological and political factors that have influenced these changes. Through this analysis we can discover patterns and make connections between how changes in standards, policy, technology and economics, combine to affect people's behaviour.

Methods and approach

- Two literature reviews have been conducted, the first to understand the historic context of space requirements in the UK, and the second to understand the social, economic, environmental and technological factors that have influenced housing design and behaviours in the home.

- The literature reviews were illustrated as a series of timelines which mapped the key events, policy influences and technological advances that have affected housing and behaviour.

- A desktop study has identified the standard layout of a mid-terrace house over the last hundred years.

- Models of the standard mid-terrace house typologies were also constructed and, with the timelines, formed part of an exhibition at the Architecture Centre in Bristol.

This project provides the baseline work to understand better how people use the spaces in their homes and how these spaces can be adapted to promote healthy and sustainable lifestyles. The project is ongoing and we look forward to reporting our findings. A bid for further funding has been submitted to the Arts and Humanities Research Council.

BAND: Behaviour and neighbourhood design – an investigation of walking as a social practice

This project seeks to understand walking as a social practice in order to inform neighbourhood design and social marketing practice. It brings together researchers from the Centre for Sustainable Planning and Environments and the Bristol Centre for Social Marketing to undertake qualitative research in a newly developed housing area in Oxford.

Purpose and context

We are seeking to:

- Gain a better understanding of how and why urban design and social marketing can support sustainable behaviours, which we will use to contribute to both theoretical and practical debates

- Test a number of intervention ideas that have been concept tested in a small pilot study and might be appropriate to effect behaviour change in different groups (and that can form the basis for one or more larger research bids)

- Develop theoretical understanding of how 'hard' and 'soft' measures can combine to influence behaviour change.

Approach

The research is being conducted in the Waterways development in Oxford. This is a relatively new mixed residential development near the city centre.

Researchers will be undertaking observations of the development, including completing observation schedules on walking activities. Observations are being undertaken in different walking settings:

- Dedicated pedestrian routes

- A small play area

- Residential streets (with shared surfaces for cars)

- A small park.

The researchers will also carry out focus groups with residents and in-depth interviews. These will explore walking as a social practice and combine questions and approaches from social marketing and built environment studies. The questions are structured around social practice theories.

Hence we will be questioning people about:

- Their walking habits – how much do they walk, where and why? For example, do they walk to work, or to exercise their dog, or to get out of the house with young children?

- What they think people who walk a lot are like – i.e. what sort of people walk for fun/fitness/to get to work, etc?

- Is walking for certain sorts of people but not for others?

- Do they need anything specific to enable them to walk?

- What are their feelings towards walking: does it make them happy, stressed, fearful?

- What makes walking easy or difficult?

- Whether or not they enjoy walking, and why

- What environmental measures might encourage them to walk more.

The research is ongoing so we do not have results as yet, though we have already learnt much about different disciplinary approaches to the research problem. We hope to use the results to be able to support more walking behaviours in new developments by understanding how environmental and other factors shape the practice of walking.

Contact details

Project lead
Prof. Katie Williams (Faculty of Environment and Technology), Prof. Alan Tapp (Faculty of Business and Law)

Faculties and project team:
Sarah Leonard (Bristol Social Marketing Centre, Faculty of Business and Law), Louise King (Centre for Sustainable Planning and Environments, Faculty of Environment and Technology)

Contact details:
katie4.williams@uwe.ac.uk

Measuring the impact: a review of the effectiveness of health appraisals in influencing development projects

This project aims to develop and test a methodology for assessing health appraisal recommendations to gain a better understanding of the effectiveness of health-integrated appraisals in achieving better health outcomes. This knowledge will help planners and public health professionals ensure that they have effective and robust health appraisal processes.

Purpose

In 2010, a systematic review of the degree to which health was effectively incorporated into plan and project appraisal identified that whilst health impact assessments are frequently undertaken, there is little evidence to demonstrate to what extent the recommendations are incorporated in the final proposal or implemented on the ground. Neither is there evidence of whether the predicted health impacts are subsequently realised. This project explores the effectiveness of health-integrated appraisal recommendations on development proposals in influencing the design and delivery of a project, and to establish whether the health implications anticipated in the appraisal were realised.

Approach

The number of health appraisals being carried out on policies, programmes and proposals has increased over the last decade. These appraisals are carried out in a variety of ways and approaches. This project seeks to understand how effective the different recommendations made through health appraisals are in influencing the design and implementation of urban development projects.

The first part of the study involved a literature review to inform the development of a review methodology and further scoping of research aims and objectives. The literature backed up the lack of published evaluation and stressed the need to establish an evidence base on the effectiveness of health appraisals in order to improve practice, efficiency and legitimacy of health appraisals.

A methodology was then developed to review (retrospectively) the type and effectiveness of health appraisal recommendations for urban development proposals. The methodology identified:

1. The types of health implications and recommendations identified by the health appraisal (HIA or other appraisal)

2. How the recommendations were incorporated into the project design, and whether they were implemented when the project was delivered

3. If any measurement or monitoring of the impact of the implemented recommendations on health outcomes was proposed

4. The factors that prevented implementation (if the recommendations were not implemented) and at what stage in the process these factors occurred.

The methodology included a qualitative desktop review of the health appraisal report; in-depth interviews with the key individuals (report author/s, planning case officer); scrutiny of local datasets; and, where possible, a site visit to the implemented development.

In the final stage of the project, the proposed methodology will be tested on the identified health appraisals to identify the types of recommendations that were included and if responsibilities for implementation were identified. This pilot study will strengthen and support a bid for a research grant from the National Institute of Health Research (NIHR) Public Health Programme, which is the primary focus of this project.

Contact details

Project lead:
Sarah Burgess

Project team and faculties:
Paul Pilkington (HLS), David Evans (HLS), Laurence Carmichael (FET), Jane Meyrick (HLS), Sarah Hills (ISHE), Hugh Barton (FET), Selena Gray (HLS), Judy Orme (HLS)

Contact details:
sarah2.burgess@uwe.ac.uk

Funder and programme:
HEAT@UWE

Timescale:
June 2011 – June 2012

Mapping spaces of participation: Young people, citizenship and the negotiation of identity in the context of spatial regulation

This project examines issues of participation, citizenship and identity in relation to young people, with a focus on the impact of anti-social behaviour control measures on the social use of public spaces by young people. We have undertaken pilot work, and have begun to develop a multidisciplinary methodological approach.

Purpose and context

The last decade has seen the introduction of a number of new measures aimed at tackling anti-social behaviour (ASB). One example being dispersal zones, which allow police to disperse groups in designated areas, and to return children under the age of 16 to their homes after 9 pm. These powers are commonly aimed at young people (Crawford and Lister, 2007), thus problematising the presence of young people in a variety of public spaces, and regulating their use of it to a greater degree.

In this project, we refer to these ASB control measures as a paradigmatic example of spatial restriction that impacts significantly on young people. Moreover, we attempt to draw together social psychological work on place and identity with work on children's geographies, in order to examine the ways in which young people experience and negotiate such forms of spatial restriction in their everyday use of place.

Method

A series of pilot studies have been undertaken, including:

- Focus groups with young people (aged 11-16) at youth clubs and schools in areas close to ASB dispersal zones.

- Semi-structured interviews with police officers and police constable support officers involved in the control of ASB.

- GIS analysis of spatial data collected from the young people via a mapping task (shown in figures opposite) where they were asked to draw and discuss the places that they visit, as well as GIS analysis of data provided by the police on ASB 'hotspots'.

Results

Some initial results from the pilot work with young people include:

- In their everyday use of space young people negotiate a number of competing concerns around the problematic nature of childhood, their own positioning on its boundaries with adulthood, as well as competing notions of appropriate space use.

- Young people both recognise and resist the need for spatial regulation in terms of their own use of space. That is, such control is often seen as important and necessary to addressing their own safety, whilst also seen as impinging on their rightful and appropriate use of different spaces.

- Young people typically occupy micro-geographical spaces, and have a strong insider identity within such spaces. In addition, their space use is highly social, centred on notions of visibility and presence.

- Young people's focus groups have revealed the importance of notions of participation and citizenship, which speak to current concerns around localism agendas and 'Big Society'.

We are currently writing up this work for publication, and are developing a multidisciplinary methodological approach to inform our larger grant proposal. Given current political interest in ASB and its regulation, we are necessarily studying a moving target. Our developing research proposal will be responsive to these findings and to the changing policy context.

Contact details

Project lead:
Debra Gray (Health and Life Sciences)
Faculties and project team:
Rachel Manning (Faculty of Health and Life Sciences), Michael Horswell (Faculty of Environment and Technology)
Contact details:
debra.gray@uwe.ac.uk

Interdisciplinary study of crowd behaviour

Prediction and control of crowd flow is particularly urgent at bottlenecks in traffic networks and public spaces such as railway stations, airports or shopping malls. This study aims to further our understanding of human crowd behaviour through combining modelling and experimentation on ants.

Purpose

Similarities have been observed between human behaviour in the built environment and collective animal behaviour in the natural environment. The behaviour of ants is of particular relevance here.
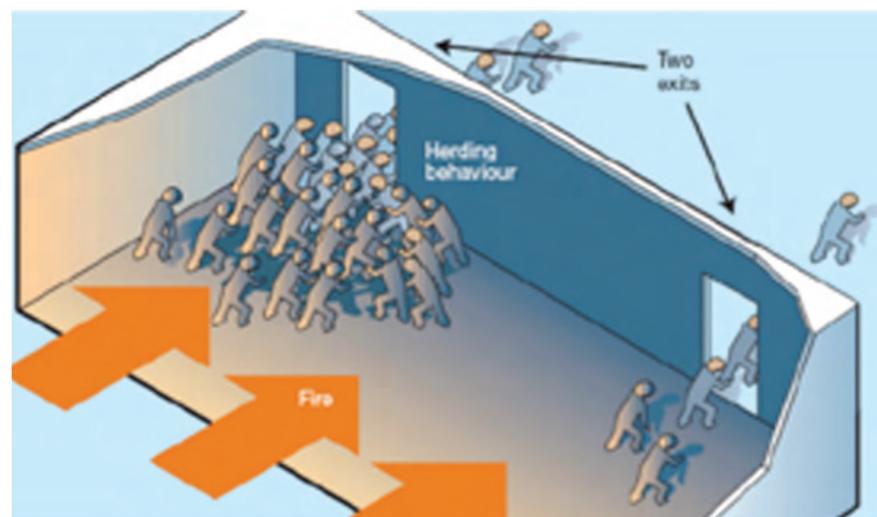
First, both humans and ants are very social creatures and both are very successful ecologically. The total biomass of ants on Earth is equal to that of humanity today. Second, ants lend themselves to manipulative experiments which would be difficult to carry out on humans for ethical or practical reasons. Third, many of the individual behavioural patterns in ants have evolved through selection at the level of the whole society over millions of years.

Our aim is to carry out a feasibility study on ants as models for crowd behaviour. We are considering the advantages and disadvantages of this approach, previous work on evacuation behaviour involving animal experimentation, types of existing mathematical models, formulation of testable hypotheses, the applicability to human behaviour and the design of public spaces.

The work is informed by three broad theoretical models of crowd behaviour:

- macroscopic – aggregate representations of flow, density and speed using partial differential equations;
- microscopic – individual behaviour representation using agent-based or cellular automata simulation modelling (examples are the Magnetic Force Model and the Social Force Model);
- mesoscopic models – an intermediate approach (Shiwakoti *et al.*, 2008).

Empirical validation is based mainly on experiments with human crowds and human evacuation trials. Recently experiments have also been performed on escaping mice (Saloma *et al.*, 2003) and escaping ants (Altschuler et al., 2008).

There is a huge potential for our further understanding of human crowd behaviour in combining modelling and experimentation on ants. We will explore the role of information and its spread, which can reduce reaction time and increase the efficiency of egress. Learning, leadership and imitation also have an important role to play in improving efficiency. Lessons from experiments with ants coupled with micro and macroscopic modelling will also be particularly valuable for understanding panic, its gradation and the role of social interactions in its development.

Contact details

Project lead:
Ana Sendova-Franks
Faculty:
Faculty of Environment and Technology
Project team:
Ana Sendova-Franks, Owen Waygood, Jan Van lent, Alison Hooper, Erel Avineri
Contact details:
Ana.Sendova-Franks@uwe.ac.uk
Funder and programme:
heat@uwe
Timescale:

Self-help for student social anxiety: (SASHA): development and evaluation of a mobile phone prototype

The project developed and evaluated a prototype mobile phone application for students suffering from social anxiety in learning situations. The application provides a four-factor self-appraisal profile and an events tracking facility to help students identify and target social anxiety concerns. Following further improvements the application is now being professionally developed.

Purpose

Survey data from two universities in the South West of England indicate that 10% of students experience significant levels of social anxiety in learning situations such as lectures, seminars and presentations and that this has an enduring impact on their engagement with learning. Sufferers are reluctant to seek face-to-face help but can be comfortable with online contact.

Can a mobile phone application be a suitably engaging and useful self-help facility for social anxiety sufferers? What are the challenges in integrating therapeutic self-help models into a usable mobile interaction experience?

This multidisciplinary project included practitioners and academics from counselling, psychology, human-computer interaction and mobile technology development.

Method

The first phase included secondary research which identified appropriate content, including the four-factor profile (affective, cognitive, physiological and behavioural) on which the self-help functions are based. This was followed by a workshop held with students where potential functions and features for the mobile phone application were identified and ranked.

The research used participatory design and testing with groups of UWE students. A prototype Android application was developed and made available for a cohort of student testers with self-reported social anxiety.

The second phase involved three cycles of testing and evaluation with students. Students worked through a series of tasks where their interactions with the mobile phones were video recorded and they were asked to 'think-aloud' and discuss issues that arose. This also provided the opportunity for them to further discuss their preferences regarding use of mobile phone technology and how it might support the management of their social anxiety.

Students also took the phones away and conducted fortnight long field trials with the application. Usage patterns and reflective narratives were collected during this time.

Further development of the prototype application followed on from the testing phases, informed by the results.

The main results and outcomes were:

- Students most valued the ability to construct an anxiety profile and track it over time using a visual representation of the data. They also wanted the application to be efficient and succinct.

- Students were interested in a forum feature to enable knowledge sharing but expressed a strong preference for anonymity and did not want a social aspect to be connected with their usual social networks.

- Anxiety-inducing events identified by the students were not limited to learning situations but included other everyday situations.

- Students wanted to include personalised self-profiling and event content in addition to the four-factor monitoring.

- Usability testing helped us to make the terminology and data representation more understandable.

- A major outcome of this project has been the provision of university funding for the development of apps for iPhone and Android. This will provide self-help for anxiety, initially being made available to the student population.

Contact details

Project lead:
Paul Matthews (Faculty of Environment and Technology)
Faculties and Project Team:
Phil Topham (Faculty of Health and Life Sciences:) Praminda Caleb-Solly (Faculty of Environment and Technology)
Contact details:
paul2.matthews@uwe.ac.uk

Development and evaluation of a computer graphics application for communicating body perception in patients with Complex Regional Pain Syndrome

Patients with pain can experience distressing changes in body image. They often find it difficult to describe their perceptions of affected body parts to clinicians. Computer graphics offer an opportunity to provide an interactive tool to communicate perceptions of body image. A prototype application was developed and evaluated by ten patients.

Purpose and context

Patients with Complex Regional Pain Syndrome (CRPS) experience distressing changes in body perception. These altered perceptions are difficult for patients to describe to clinicians as they do not match objective signs and they fear being disbelieved. Difficulty in communicating these altered body perceptions can further exacerbate their distressing emotional impact. Self portrait sketches are sometimes used, but this method is limited by the individual's capacity to draw. The purpose of this project was to develop an application that patients will be able to use to create a 3D model of their perceived body image.

Approach

Using data from a previous exploratory study of body perception and consultation with a person with CRPS, the first prototype digital media application was developed. The application allows modification of an avatar to depict alterations in size, shape, colour or visible surface texture of multiple body areas (see figure opposite). It has so far been tested with ten patients, admitted to an inpatient CRPS rehabilitation programme, who gave consent to participate in the research. Participants used the application in a consultation with the research nurse. Audio recordings were made of the participants using the application and participants were asked to complete a structured questionnaire to ascertain their views and experience of using the tool. Responses to questionnaires and audio recordings were subjected to analysis to determine acceptability of the application and its limitations.
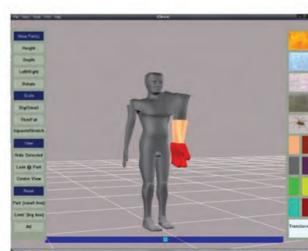
Results

The images produced are powerful illustrations of the distortions in body perception that patients with CRPS experience. Participants described the positive impact for them of now seeing an image of a limb that they had previously only imagined and could now convey to others.
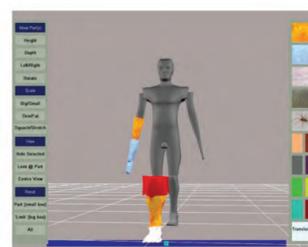
"It looks in human form exactly how I feel and I've never had that. I've sat and said this hand feels longer and feels wider from there. I know I can see it but this is the first time someone else can."

"It feels massive it feels like a club"
"My hand looks black to me..
That is a big part of my hand it does look blac
it does look dark"

"...where I have the problem with the hand it just feels as if it is huge, very swollen, and at the top of my shoulder here I feel as if I have a lump, almost like a Quasimodo like thing."

"Gosh that looks weird"
Int: "How does it feel looking at it on screen?"

"Horrible, its horrible that I actually perceive it as that, that's strange"

" Its constantly on fire..it feels huge and heavy."
 "... in your head I haven't said this word but I've felt this, you feel freakish, so you look at that and you think yeah that is how I feel".

There were some additional features they identified to improve the usability of the application and reality of the final image, e.g. adding the software capabilities to smaller sections of the limb such as each finger and more sophisticated textures to describe some of the conflicting sensations experienced.

This is the first time CRPS-evoked image disturbances in body perception have been captured in such an explicit manner. The quality of the graphics enhanced the reality of the image thereby helping patients to fully convey to themselves and others how altered their bodies seem to them. Refinement of the software programme is in progress to enhance the detail and to allow measurement of change over time. We envisage that this tool could extend beyond being a very useful communication device and also become a meaningful outcome measure.

Contact details

Project lead:
Dr Ailie Turton (Health and Life Sciences)
Faculties and project team:
Mark Palmer (Faculty of Environment and Technology),
Candy McCabe, Tim Moss, Nichola Rumsey (Faculty of Health and Life Sciences),
Sharon Grieve and Jenny Lewis (Royal National Hospital for Rheumatic Diseases).
Contact details:
ailie.turton@uwe.ac.uk

Development of an Electrical Sensory Discrimination Therapies device (ESDT) for the relief of chronic pain in Complex Regional Pain Syndrome

This project brings together colleagues from computer science and healthcare research to further develop a therapeutic device for the relief of chronic pain. An Electrical Sensory Discrimination Therapy device (ESDT), that can improve sensory discrimination, has been developed for patients to use independently in their home.

Touch pad Netbook with instructions on how to progress through the hierarchy of stimulations

Button box for subject to indicate which electrode was stimulated

Four electrodes set within a fixed template

Electrical stimulator supply

The Electrical Sensory Discrimination Training Device in use

Purpose and context

Complex Regional Pain Syndrome (CRPS) is a distressing chronic pain condition that has a significant impact on patients' quality of life. Treatment options are limited and long term disability common. Research has shown changes in the brain's sensory representation of the painful affected limb is closely linked to the level of pain experienced. Studies in amputees with phantom limb pain and patients with CRPS, have demonstrated that sensory retraining of the affected limb can reverse cortical changes and reduce pain. This project aims to develop an Electrical Sensory Discrimination Therapy device (ESDT) to improve sensory discrimination in the CRPS affected limb.
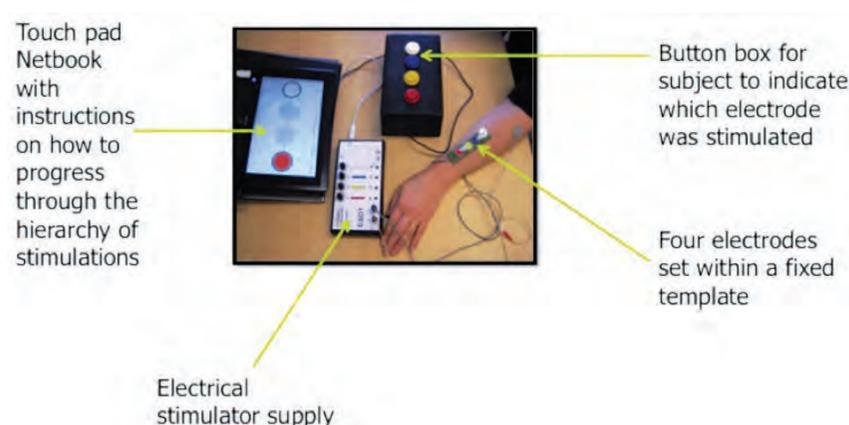
Method

Stage 1: Modification of the software of our current ESDT device

The initial device required the stimulus protocols to be manually selected by the operator. The software has now been developed as an automated system. This allows the user to set the stimulation level, provide a hierarchical training sequence, record the responses and select a stimulus protocol with the appropriate level of difficulty. The system provides visual feedback to the patient regarding the operation of the device and the results of the tests. To encourage adherence to therapy and reinforce learning we have developed a games-based training environment. Appropriate hardware has been developed with colleagues at Odstock Medical and the Bath Institute for Medical Engineering.

Stage 2: Clinical testing to assess the usability from the patients' perspective

The prototype device was tested and modified following trials with healthy volunteers, CRPS expert patient researchers, and new CRPS in-patients. Patients will maintain an active role throughout the project, giving feedback on the prototype and future trial design.

Stage 3: A Phase II: defining trial and intervention study.

Collection of clinical data from an intervention (n =10) and control group (n=10) to help inform the effect size and design of a future randomised controlled trial in a larger population with a potentially commercially viable device.

Results

Following feedback the device is now ready to be used by patients independently at home. It is anticipated that data collection for Stage 3 will commence June 2012. The system could potentially be also used for pain relief following brain injury or stroke.

The potential for mathematical models to help re-roster nurse shifts with minimal disruption: a literature review

Nursing staff shift re-rostering is a more frequent and difficult task than rostering that can be time-consuming for nursing managers. This project explores the potential for mathematical optimisation models to help re-roster nurse shifts and to improve the quality of care and nursing morale, while minimising use of extra staff.

Purpose

Nursing staff shift re-rostering requires specific methodological support to help manage disruption and minimise its impact. Clark and Walker (2011) proposed fast models for rostering and then re-rostering nurses' shifts. However, to be useful in practice, the models need testing and refining in the field. This is the aim of this scoping exercise which will examine the feasibility of using mathematical models and develop a mathematics-nursing interdisciplinary research collaboration.

Method

The background research for the review searched on key terms in multiple medical, health and scientific bibliographic databases, complemented by scoping discussions with nursing managers. The analysis of the literature indicated only a small amount of research to specifically support rerostering.

In order to obtain insights and properly scope the issue of re-rostering, the authors had informal discussions with seven senior nursing managers from four hospitals, and identified the following common perspective:

- Nurse rostering is considered a strategic issue due to the substantial research that links nurse rosters to the quality of patient care, and also because staff are the most costly element in running their hospital.

- Understaffed shifts not only cause morale issues but also can have a substantial negative impact in emergency situations, increasing the number of adverse events.

- Monthly rostering is time consuming enough (e.g. a day a month), but re-rostering is required on most days and can take up a significant amount of a ward manager's time.

- Re-rostering may be required very quickly.

Results

The result of the background research is that re-rostering is under researched, despite the daily challenge posed to nurse managers and practitioners. The background research and scoping discussions indicated that re-rostering requires specific methodological support to help nursing managers (such as ward sisters and matrons) to manage disruption and minimise its impact. Beyond simply adopting rostering software, nursing management need to support trust-wide daily re-rostering via the provision of human-oriented systems, training and quality data, coupled with a quantitative methodology that takes account of staff preferences in order to minimise the disruptive consequences of re-rostering on the quality of care, its cost, and staff morale. The models on Clark and Walker (2011) propose such support, but further research is needed to assess the viability to achieve this in operational practice.

Bodytrack

Four participants used technology to monitor their own health and local environmental factors. A customised iPod application was used to record health concerns and dietary inputs. A secure online graphing tool was created for each participant. The equipment confirmed suspicions, revealed new information and, in one instance, did not reveal anything.

Image by MyZeo

Purpose and context

Individual health is influenced by diet, exercise and external environmental factors such as air quality, temperature, sound and vibration. Research has shown that these factors can influence health, for example bringing forward approximately 30,000 deaths per annum due to air pollution alone in the UK. While individuals are able to make informed choices about diet due to food labelling their choices in response to environmental factors can be harder to make due to these factors' relative invisibility. By understanding their personal micro-environment and how it fluctuates over daily, weekly and monthly cycles individuals could take control over aspects of their own health and wellbeing.

Method

The aim was to develop an exploratory project piloting and evaluating the use of BodyTrack technology for understanding individual health.

The project objectives were as follows:

• Recruit 5 individuals (from At-Bristol's family membership).

• Provide each participant with a BodyTrack module comprising: sleep, activity, air quality, light monitors, a customised iPod application to capture their health variations and a password protected graphing tool to compile and view all the data.

• Interview participants before and after their use of the BodyTrack equipment to evaluate the technology from the participants' perspectives.

Four participants were recruited with each taking a full complement of BodyTrack equipment. Three of the participants had relatively simple health issues for example, disturbed sleep, drowsiness and itchy palette. One participant had complex health issues which were not being successfully dealt with through conventional medicine. All participants were female.

Results

Preliminary findings from the interview data suggest that the participants found the BodyTrack equipment helpful in understanding patterns of personal health. The graphing software was less helpful due its complexity.

Three participants found the sleep monitor confirmed suspicions (for example: that working late or using a screen into the evening disrupted sleep, or that their sleep was consistently poor) and revealed new information. One participant found the equipment revealed exercise as a significant influence on sleep quality. One participant felt that the sleep monitor data did not accurately reflect her experiences so she tended to reject the data from that monitor.

Three participants stated they had made specific behaviour changes as a result of the project: two changing screen use, one changing exercise and one making an appointment to attend a sleep clinic.

The graphing software was overly complex for the participants' needs. Three of the four participants could identify correlations between data and their health without the need for the graph. The fourth participant had complex health issues and she felt the technology was not sensitive enough to detect changes in her well being.

Contact details

Wireless Sensor Network for Water Quality Monitoring @UWE

This interdisciplinary project brings together stakeholders from the microelectronics, environmental, sensor technologies and resource management sectors (from industry and academia) to design and implement a wireless sensor network for the acquisition of real-time continuous, water quality monitoring data from aquatic environments located on the UWE campus at Frenchay, Bristol.

Purpose

The project aims to:

- Pilot a sensor development, data management and analysis test facility at UWE.

- Establish a wireless sensor network that allows the remote monitoring of water quality parameters of UWE aquatic habitats.

Specifically we will:

- Identify appropriate sites and sensor devices for deployment.

- Establish and test a working sensor network.

- Perform continuous water quality monitoring via a wireless sensing network over 10 weeks.

- Analyse the data to inform water resource management at UWE.

Method

This project incorporates wireless telemetry units connected to a series of water quality sensors for deployment in the field. The sensors chosen for this include dissolved oxygen (optical sensor), turbidity, temperature and pH housed in a Manta2 water quality multi-probe. Other sensors will include the development, use and implementation of novel fluorescence-based sensors and microbial fuel cells (living sensors).

Our sensor network will incorporate an Adcon telemetry system that allows users to build low-power wireless sensor networks for a wide range of applications. This will allow real-time continuous monitoring of water quality data. Live streaming data from the sensor network can be made available to investigators and all stakeholders via the web.

This project will establish:

- New collaborations

  SMEs in the environmental monitoring data supply chain (sensor developers and suppliers, wireless data analysis experts) with academic excellence in signal processing and sensor technologies.

- Advances in Knowledge

  Independent analysis and verification of in-situ monitoring data and efficacy of wireless sensor networks.

- New Capacity

  A test site facility for wireless sensing and networking for environmental sensor technologies (optical sensors and Microbial Fuel Cells as living sensors). This facility/pilot would be the first of its kind in the Southwest.

- Knowledge Creation

  This program of work will contribute to the validation of emerging sensor technology (provided by Chelsea Technologies Group).

- New Business Opportunities

  This pilot study will help facilitate collaboration and stimulate innovation and product development in high tech, environmental technologies, whilst creating jobs and new routes to market, and adding value to the SW regional economy.

- Sustainable Development Agenda

  The data produced will allow improvement in UWE's performance monitoring under ISO14001 and inform a programme of works to improve biodiversity and aquatic habitat environments. The project will also engage academic research and practical student learning in a live water management project.

Contact details

Project lead:
Associate Professor Darren Reynolds (Faculty of Health and Life Sciences)
Faculties and project team:
Dr Mokhtar Nibouche, Dr Ioannis Ieropoulos (Faculty of Environment and Technology), Prof. John Greenman, Dr Robin Thorn (Faculty of Health and Life Sciences), Mark Webster (Facilities Environment), Simon Browning (RShydro Ltd), Justin Dunning (Chelsea TG)
Contact details:
Darren.Reynolds@uwe.ac.uk
Timescale:
March to September, 2012).

Faculty of Environment and Technology

UWE, Bristol
Frenchay Campus
Coldharbour Lane
Bristol BS16 1QY

Telephone 0117 965 6261