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RESEARCH
SHOWCASE

16
June 2011

Poster Abstracts

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It is with great pleasure that I welcome you to the 2011 Research Showcase within the College of Science and Technology. This is the first such event in our new College and gives us the opportunity to showcase to our friends and colleagues, internally and externally, the fantastic research that we undertake.

I am proud of the research that goes on within our College, research that addresses issues which affect everyday people in their normal lives, such as work being undertaken in developing cancer drugs, research into energy and nuclear technology, metamaterials, environmental and ecological studies to name but a few, all ground breaking research designing, developing and building for a better future.

The Arts may feed the soul, Health Experts nurture the body, but as we all know it is Science and Technology that saves the world! I hope you enjoy the day.

Professor Ghassan Aouad,
Pro Vice Chancellor Research & Innovation
Dean, College of Science & Technology

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School of the Built Environment

Mainstreaming Women for Disaster Risk Reduction in the Built Environment

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Reducing disaster vulnerabilities of the built environment plays a significant role in reducing the risk of natural disasters since most of the disaster losses and impacts occur due to the damages to the built environment caused by disasters. In reducing the vulnerabilities, it is important to consider the knowledge, experiences and needs of different groups in the local community since they facilitate to identify the nature of disaster vulnerabilities of the community leading to achieve disaster risk reduction more effectively. Women in particular have different knowledge, experiences and needs in disaster risk reduction due to their social roles and responsibilities that expose them into different conditions in disasters making them more vulnerable. This doctoral research in this context is aimed at investigating how women's knowledge, experiences and needs can be mainstreamed with disaster risk reduction in the built environment. In particular, the study attempts to find out, the ways of identifying women's disaster risk reduction related knowledge, experiences and needs and the means of integrating them into disaster risk reduction in the built environment. Having identified the study as a social research and believing in pragmatism the research takes an interpretivist philosophical stance. Primary data for the research is collected through a series of semi structured interviews among personalities involved in disaster risk reduction related policy making, academia, authorities and other institutions in Sri Lanka. Sri Lanka is the geographical scope of the study's empirical research. Findings of the study indicate needs assessment and public consultation as the main modes of mainstreaming women with disaster risk reduction in the built environment. Construction brief is shown as an effective way of integrating women's knowledge, experiences and needs into construction activities. In contrast to literature, findings through secondary data suggest women's involvement in decision making in the construction industry is not a requisite for mainstreaming women.

Capacity Building for Post Disaster Waste Management: Construction and Demolition Waste

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Increasing nature of impacts from disasters has made post disaster management a key area of concern. The management of disaster waste is revealed as an area of least concern yet it presents momentous challenges for those with inadequate capacities due to the large volume and hazardous constituents created, specifically in developing countries. This is equally applicable to Sri Lanka which was severely affected by Indian Ocean Tsunami in 2004 and three decade of civil war. In this context, it is vital to explore the capacities which need to be enhanced for effective post disaster waste management. In this context, this study focuses on identification of existing capacities of post disaster waste management with special emphasise to Construction & Demolition waste (C&D) is at national level agencies.

First, literature review and documentary survey were conducted on capacity building in various disciplines with special emphasise on post disaster waste management to identify capacity building principles, strategies, evaluation measures and challenges. Multiple case studies and expert interviews were conducted to gather primary information on existing capacities of post disaster waste management in Sri Lanka. Three case studies covering fifteen agencies and six expertise representing government, non government and other sectors were selected for data collection. Semi-structured interviews were held as the main data collection method and code based analysis and cognitive mapping were used to analyse collected data.

Results revealed of existing capacities, capacity gaps and factors affecting capacity building of post disaster waste management including key areas as skills and confidence building, links and collaborations, continuity and sustainability, research and development, communication and coordination, organisational implementations and investments in infrastructure. Approaches with criteria for measuring the process of enhancing capacities of post disaster waste management have been identified with the aim that the research findings will contribute towards achieving effective and sustainable post disaster C&D waste management through enhancing the capacities at national agencies.

Culture and Disaster Risk Reduction

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The importance of culture towards disaster risk reduction (DRR) was highlighted during the Indian Ocean Tsunami in December 2004. When some communities with traditional knowledge regarding Tsunami were successfully survived, migrants and tourists who did not have local knowledge were hugely affected. Despite the importance of culture towards effective DRR, it is often claimed that DRR strategies neglect socio-cultural elements and human environment interactions of communities. Failure to address cultural aspects could lead to increase vulnerabilities of community towards disasters and the development of unsuccessful DRR strategies. On the other hand, neglecting DRR strategies due to cultural believes can increase the vulnerability of communities towards disasters. Evidence shows that communities who neglected scientific knowledge whilst relying on cultural believes and traditional indigenous knowledge failed in some occasions.

This indicates the significance of culture of a disaster affected community towards DRR strategies. Contradictions between strong believes, attachments to culture and human environment interactions can challenge DRR strategies. Lack of considerations on cultural aspects of the affected community can hamper effective DRR strategies thus increasing vulnerability of the affected community rather than reducing it. Therefore, this brings to a situation where we need to make DRR strategies compatible with cultural aspects of communities in further strengthening their coping capacity towards disasters.

Aim: The aim of this study is to explore and identify ways to integrate cultural aspects when formulating effective disaster risk reduction strategies. Accordingly the study addresses the following research questions.

- How to integrate positive aspects of culture towards effective DRR activities?
- How to reduce negative impact from culture towards DRR activities?
- How to make DRR strategies compatible with cultural aspects of community?

Empowering Local Governments in Promoting Disaster Resilient Cities

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Disasters cause a considerable impact to the entire world. The occurrence of disasters has increased significantly in the recent past resulting a higher number of mortalities and economic and social losses. It is evident that the severity of the impact of disasters is linked to unplanned urban development. Due to rapid urbanization and population growth the cities are becoming increasingly vulnerable to disasters. Therefore, there is a high need to incorporate proper risk reduction mechanisms to make cities resilient to disasters. This requires a serious effort of various stake holders including governmental and non-governmental institutions. The local governments being the first responder and the one responsible for community development, has a key role to play in achieving the resilience of the cities under their jurisdiction. Even though there is a growing concern among researchers and practitioners on the role of the local governments in making cities resilient, several incidents have been reported on the inadequate contribution of local governments in taking the lead role of initiating risk reduction. This could mainly be attributed to inadequate financial, manpower and other resources available with local governments, in addition to their failure to make timely decisions due to lack of authority. This has emphasized the need for empowering local governments with improved governance structures and the need for developing capacities to lead the concept of resilience in their respective local areas. In this context, aim of this research is to develop a framework to empower local governments to make cities resilient to disasters in the built environment context.

Case studies have been identified as the most appropriate research strategy for this research. Accordingly, it is intended to conduct three case studies by selecting three cities in Sri Lanka which are potentially vulnerable to disasters and the findings would be generalized across the country.

Community Engagement for Risk Erosion in Bangladesh to Enhance LifeLong Advantage (CEREBELLA)

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Bangladesh is a South Asian developing nation that faces variety of long-lasting problems which have been further exaggerated due to frequent natural disasters. Owing to geographical settings, environmental reasons, dense population and poverty, Bangladesh is currently ranked as one of the world's most disaster-prone countries. The frequent natural hazards such as cyclones, storm surges and floods account for significant losses in human lives and physical assets. Losses created by disasters and climate change in Bangladesh highlight the importance of making communities resilient against them. However, lack of education and research on disaster risk reduction (DRR) and climate change adaptation has been a critical issue in Bangladesh. In this context, CEREBELLA was initiated as a 3 year 'International Strategic Partnerships in Research and Education' (INSPIRE) Project funded by the British Council aiming at creating a long-term sustainable and strategic partnership between Patuakhali Science and Technology University, Bangladesh and Centre for Disaster Resilience, University of Salford to share skills, knowledge and experience on climate change and disaster management academic learning and research. In achieving this aim, the project intends to:

- Carryout hazard, vulnerability, risk analysis and develop risk response strategies for DRR and climate change adaptation with the engagement of community and local authority of Patuakhali, Bangladesh
- Provide recommendations for urban safety planning based on disaster risk and climate change impacts of Patuakhali, Bangladesh
- Update and develop undergraduate/postgraduate curriculum on DRR and climate change adaptation
- Facilitate staff exchange and training programmes to enhance capacity of partner institutions to develop knowledge, competencies and international research skills

Developing Standards for Post Conflict Housing Reconstruction

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Conflicts continue in many parts of the world. Conflicts have a number of direct and indirect impacts including displacement of people, destruction of properties, economic ruin etc. Post conflict reconstruction supports to reactivate the development process that has been disrupted by the conflict. Conflicts have a greater impact on the built environment and post conflict reconstruction requires repair and reconstruction of physical structures. Furthermore, this is accepted as the most visible indicator of economic reconstruction which helps to build trust among war affected population and investors. Among these, housing remains important as housing reconstruction after war plays an important role in establishing the country's development and peace. Despite this importance, it is found that there is inconsistency between the built housing and the needs and expectations of the users. This lead to dissatisfaction in the residents and remodelling by themselves or rejection and abandonment. Hence, it is important and necessary to address conflict affected communities' housing needs and expectations during post conflict housing reconstruction. In this context, this research aims to explore how conflict affected communities' housing reconstruction needs are managed during post conflict housing reconstruction. With regard to this it is worthwhile to understand how standards are developed for post conflict housing. Therefore the objective of this poster is to present the findings of a detailed literature review on developing standards for post conflict housing reconstruction. The basic premises for developing standards for necessary housing will be identified first. Then the adequate housing indicators developed in context of Sri Lanka will be discussed. Having identified the lacking areas of these indicators, the discussion will be further extended to elaborate the factors that should be taken into consideration in developing standards for post conflict housing reconstruction.

Key words: Conflict, post conflict, Post conflict reconstruction, post conflict housing reconstruction, housing standards.

Disaster Knowledge Factors: Benefits and Lacking Areas

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Disasters bring about the loss of lives, property, employment and damage to the physical infrastructure and the environment. The number of reported disasters has increased steadily over the past century and risen very sharply during the past decade. While knowledge management can enhance the process of disaster management, there is a perceived gap in information coordination and sharing within the context of disaster management. Within this context, the identification of key disaster knowledge factors will be an enabler to manage disasters successfully. Hence this study aims to identify and map key disaster knowledge factors in managing disasters successfully through capturing the good practices and lessons learned. With regard to this, a list of disaster knowledge factors was first identified through a comprehensive literature review by covering the whole disaster management cycle: mitigation/preparedness, relief and reconstruction. Based on these literature findings, semi-structured interviews were conducted among disaster management practitioners to explore the influence, benefits and lacking areas of these disaster knowledge factors in managing disasters. The objective of this poster is to present the interview findings on benefits and lacking areas of these disaster knowledge factors in managing disasters. It is identified a comprehensive list of benefits and lacking areas of these disaster knowledge factors in managing disasters.

Key words: Disasters, disaster management, disaster knowledge factors, benefits, lacking areas.

Empowering Women during Post Disaster Reconstruction

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Frequent occurrences of disasters have drawn the attention of international institutions and many governments around the world. Many studies have reflected the need for gender consideration in disaster management, and emphasised its importance in building disaster resilient communities. In addition to poverty, environmental degradation and the different needs of men and women, the marginalised role of women within many organisations and their absence from the decision-making structures contributes to women's vulnerability in post disaster situations. In most of the instances, although disaster management efforts are designed to benefit both men and women, in practice a larger share of benefits and resources goes to men while women continue to remain marginalised. The post disaster reconstruction phase can provide windows of opportunity for physical, social, political and environmental development not only to reconstruct the impacted areas, but also to improve the socio-economic and physical conditions of the impacted population in the long term. Many studies have recognised the importance of the concept of empowerment in overcoming these problems.

In this context, this study aims to explore and investigate the implementation of the concept of empowerment for women within post disaster reconstruction in formulating a strategy that integrates community women's empowerment during disaster reconstruction activities. This study takes a position in-between a positivism stance and a social constructionism stance in the continuum of philosophies and adapts survey research strategy with mixed method of research techniques. It is expected that the research will add empirical evidence on the process of women's empowerment in post disaster reconstruction to the existing body of knowledge.

Keywords: Disasters, Empowerment, Marginalised positions, Post disaster reconstruction, Women.

Selection Criteria Frameworks for Choosing Industrialised Building System for Housing Project

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An Industrialized Building System [IBS] has been accepted as an innovation strategy to assist in overcoming key problems in the Malaysian housing sector. The manufacturers and producers of IBS have claimed that their systems have a multitude of advantages and benefits. The selection criteria used to choose the appropriate type of IBS for housing projects have been identified as one the critical issues in the decision-making process at the conceptual stage of using IBS. The criteria such as cost, time and quality play a major role in the selection tasks. Through a literature review, this paper highlights the criteria that have been considered in the adoption of IBS in the UK and in the Malaysian construction industry. It also reviews existing decision-making support and tools associated with choosing types of IBS. It is concluded that a wide perspectives and an extensive variety of factors may contribute to the impact of the effectiveness of the decision-making process associated with the selection of type of IBS. These include the structure and materials design, site orientation, safety, client perspectives, environmental issues and sustainability, organizational issues and risk. This paper recommends that a structured and holistically approach in decision-making for selecting the type of IBS is important and needed in housing projects and in the Malaysian construction industry.

The Role of Knowledge Management in Improving the Adoption and Implementation Practices of Industrialised Building System [IBS] in Malaysia

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In Malaysia, the strategic changes towards the promotion of the concept of Industrialized Building System (IBS) started in 1998. It is envisaged that the benefits expected from the adoption of IBS will have positive and dramatic impact on the culture of building practices. An important issue which is likely to influence the wider and successful implementation of IBS is the role that knowledge management plays in this regard. This relates to such issues as the knowledge ability and skills of the workforce, and the role that knowledge sharing plays in effective decision making processes to do with IBS implementation in its many and different disguises. Through a literature review, and from a knowledge management perspective, this paper highlights some of the main issues that may contribute to the implementation of IBS in Malaysia construction industry. This paper also reviews existing strategies associated with the adoption for IBS, especially as they relate to lack of knowledge and awareness among industry players and stakeholders. Some conclusions are offered relating to the level of knowledge needed to change the readiness and perception of key stakeholders toward successful and wide adoption of IBS. These include, inter alia, the need for improvement of existing university curricular related to design and construction process, continuous learning among professionals, training and knowledge sharing initiatives. This paper recommends that a robust and holistic approach to the adoption of IBS is needed and vital in order to tackle the many and related issues to do with both the adoption and implementation of IBS in Malaysia. This integrated approach should consider the knowledge awareness, strategic procurement, production process philosophies, contractual arrangement, strategic policy and decision making process to mention but a few.

A Literature Review of the Role of Project Management in Post-Disaster Reconstruction

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The number of natural disasters has increased sharply in the past few decades, threatening human lives, and the built environment. Recent disaster management paradigms have, arguably, shifted from disaster relief to disaster preparedness, hazard mitigation, and vulnerability reduction. Reconstruction activities are those activities in recovery and rehabilitation phase of disaster risk management; actions taken to restore and if possible improve pre-disaster living condition of affected communities. While emergency relief which by providing food, medical treatment, and shelter in immediate after disaster is considered effective, reconstruction as medium and long term recovery activity is usually slow, expensive, complex. If not addressed effectively, opportunities for community development are often lost. Based on a comprehensive literature review of reconstruction projects and processes in a few countries affected by natural disaster, this paper investigates and documents the roles of project management, and the roles of key stakeholders in reconstruction projects after disasters It identifies and documents the key challenges in post-disaster reconstruction projects and the main procurement strategies that are available and currently in use in the reconstruction projects. It concludes with the important role that project management plays in post-disaster reconstruction projects and the importance of managing interface issues, communication and stakeholders as part of effective project management.

Knowledge Communication
in Post-Disaster Reconstruction Project

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Construction industry is also known as a provider of services where knowledge is more important. Construction project knowledge is generated by activities of individuals, project teams and construction organisation from concept design to hand over of the final products (e.g. buildings, roads, bridges) (Egbu & Robinson, 2005). Communication involves interaction between people or organisations in the project, enables information/knowledge to move from those who have information/knowledge to those who need the information/knowledge.

Recent big natural disasters reveal big challenge in management of reconstruction project. The nature of disasters and complexity of the reconstruction give unique characteristics compare to common construction. Based on literature review, this paper investigates knowledge management in disaster management and identifies knowledge communication practices and techniques currently employed in recent disasters in few countries.

An Insight into Knowledge Sharing Practices in Quantity Surveying Firms in Malaysia

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Knowledge is increasingly being recognised as a vital organisational resource that provides the competitive advantage. Managing knowledge assets can be a challenge, especially in the construction industry, where short-term working contracts and temporary coalitions of individuals can inhibit knowledge sharing. Knowledge sharing in organisations is the act of making knowledge available to others within the organisation. It is the process by which knowledge held by an individual is converted into a medium who can be understood, absorbed, and used by other individuals. Knowledge sharing is important as it provides a link between the individual and the organisation by 'moving' knowledge that resides within individuals to the organisational level, where it is converted into economic and competitive value for the organisation. This degree of importance attached to knowledge sharing is heightened in a knowledge economy, where knowledge is seen as a valuable resource for innovation and for gaining competitive advantage. However, increasing evidence points to a paucity of research that has investigated the nature of the different approaches to improving the effectiveness of knowledge sharing, the appropriate organisational factors at play for knowledge sharing to be fully exploited, and its benefits to Quantity Surveying (QS) Firms. Therefore, this paper purports to provide an insight into knowledge sharing in Quantity Surveying (QS) Firms in Malaysia. Through pilot questionnaires, views on key issues to do with knowledge sharing in the organisation were sought from quantity surveying firms from Malaysia. The paper presents some key aspects of the findings, and offer targeted conclusions and recommendations for the benefit of organisations, industry and academia.

Knowledge Sharing Initiatives in Quantity Surveying Firms in Malaysia: Promoting, Inhibiting and Challenge Factors

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Knowledge sharing in an organisation is the act of making knowledge available to others within the organisation. It is the process by which knowledge held by an individual is converted into a medium who can be understood, absorbed, and used by other individuals. Knowledge sharing is important as it provides a link between the individual and the organisation by 'moving' knowledge that resides within individuals to the organisational level, where it is converted into economic and competitive value for the organisation. This degree of importance attached to knowledge sharing is heightened in a knowledge economy, where knowledge is seen as a valuable resource for innovation and for gaining competitive advantage. However, increasing evidence points to a paucity of research that has investigated the nature of the different approaches to improving the effectiveness of knowledge sharing initiatives, and the appropriate organisational factors at play for knowledge sharing to be fully exploited, and its benefits derived within Quantity Surveying (QS) firms in Malaysia. This paper is based on a survey conducted among 282 respondents and interviews with 20 interviewees in QS firms Malaysia to explore and documents promoting factors, inhibiting factors and challenges that organisation face with regard to knowledge sharing. The findings show that there are promoting factors associated with the effective knowledge sharing initiatives: business strategy; organisational resources; reward; organisational culture and organisational infrastructure. Inhibiting factors are time constraint, depending on adequate resources for KM development, lacking of communication skill and social network, lacking of knowledge about KM and attitude of staffs and challenges are KM strategy, training, business strategy, adequate resources and organisational culture.

The Significance of Formal and Informal Approaches to Knowledge Sharing in Malaysian Construction Organisations

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Few would argue with the principle that the sharing of relevant knowledge is important. But the significance of formal and informal approaches to knowledge sharing in the Malaysian construction industries has received little or no consideration. Malaysian practitioner's perceptions of formal and informal approaches to knowledge sharing in the construction organisations are discussed in this paper. This is based on a study which combines qualitative and quantitative research methods including a literature review, semi structured interviews and questionnaire surveys involving small, medium and large construction organisations in Malaysia. A total of 384 completed questionnaires were returned and 28 semi- structured interviews were conducted with practitioners at different levels of management. The findings indicate that all participants are of the view that formal and informal approaches to knowledge sharing make a significant contribution towards the improvement of organisation performance. It is, however, suggested that the most influential factors are organisational structure (formal rules, regulations and controls, different types of professionals and task differentiation); organisational culture (integrated into groups, long-term as opposed to short-term orientation); and human resource practices (training and development in providing a better understanding on the concept of knowledge sharing initiatives, performance appraisal in promoting knowledge sharing initiatives), and that these impact on the sharing of knowledge in Malaysian construction organisations in complex ways. Understanding the effectiveness of formal and informal approaches to knowledge sharing may assist construction organisations in taking full advantage of the improvement in organisation performance.

A Review of Literature on Knowledge Management Strategy – Lessons Learned for the Construction Industry and Research

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In business management, the management of knowledge has been touted as the way forward in ensuring the survival and resilience of organisations. But differing opinions abound as to how its strategies could be successfully managed. Despite the increase in adoption of knowledge management concepts in other industrial sectors, the construction industry has, arguably, been slow to adopt effective knowledge management practices and strategies, and exploiting the potential benefits of knowledge management concepts and initiatives. This paper reviews available literature on knowledge management practices and strategies in other sectors and attempts to reconcile these strategies with what pertains in the construction industry. The paper also discusses the importance of knowledge management to organisational survival and competitiveness. It proffers some suggestions as to the factors that are worthy of consideration for knowledge management strategies that could be of benefit to construction organisations. It concludes by drawing our attention to the complexities of factors impacted upon the success of knowledge management strategies and initiatives. It also argues that these complexities raise interesting challenges for organisations and for research strategies and designs used in examining knowledge management strategies and practices in construction organisations.

Knowledge Sharing Initiatives in Malaysia Local Authorities (MLAs): Issue and Challenges

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Malaysian Local Authorities can be seen as knowledge intensive organisations. In order to exploit effective knowledge sharing, they have to develop practical knowledge sharing initiatives. The ability of sharing knowledge within organisations and employees has been found to contribute to organisational performance and the potential to benefit local authorities in view of their role. Hench the degree to which an organisation effectively applies knowledge sharing initiatives is an indicator of effective knowledge management in an organisation. This paper aims to identify the core issues and challenges in knowledge sharing initiatives that local authorities faces in their role in the planning permission process. The paper draws from an ongoing PhD Programme which involves the analysis of semi-structured interviews and questionnaires receives from personnel within local authorities in Malaysia. Issue on exploiting employees skill, relationship, leaders' commitment, decision by top management and procedure were identified as key issues and challenges. It is recommended that a balanced approach and support to these issues and challenges in implementing knowledge sharing initiatives should be duly considered together with attention given to effective leadership, strategic alignments and choices and capability and capacity building among teams.

Measuring the Impact of Knowledge Sharing on the Planning Permission Process in Malaysian Local Authorities

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Knowledge sharing is a fundamental knowledge management process. For large organisations like local authorities, the ability to effectively share knowledge across organisations can lead to improved service delivery and the achievement of best practices. Hence, the degree to which an organisation effectively applies knowledge sharing initiatives is an indicator of the organisation's knowledge management development; yet organisations still struggle to measure the gains it promises to offer. This paper aims to explore and measure the impact of knowledge sharing and also explores the challenges which organisations face in delivering effective policies, particularly in their role in the planning permission process. The paper draws from an ongoing PhD programme; it also draws on a thorough review of the literature and on data obtained from local authorities in Malaysia. The paper highlights the potential benefits of knowledge sharing in organisations. The paper concludes that measuring the impact of knowledge sharing in local authorities is challenging. The findings also indicate that organisational performance is dependent on the effective use and management of knowledge sharing initiatives.

Contribution of Women Managers to Construction

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The UK construction industry faces many challenges such as low performance, high dissatisfaction among clients, low productivity, poor image, high fragmentation etc and the industry has been facing skills and labour shortages for many years. Further, it faces recruitment difficulties particularly at senior and middle level management. Construction industry is typically portrayed as a male dominated industry. Women are under-represented particularly at the managerial and technical grades mainly due to the barriers associated with recruitment and retention. The typical gender segregation in the industry has led to the industry being unable to benefit from the diverse skills that women can offer. Increasing the number of women managers may have an impact on the traditional gender segregation pattern. It is therefore imperative to explore the contribution women managers could bring to the construction industry. This contribution is measured as considering the leadership styles of women managers, as leadership is considered an important quality for those who occupy managerial positions in organisations. Thus, the aim of this ongoing PhD research is to explore and investigate the contribution of women managers towards the construction industry.

This research adopted case study as the most appropriate research approach. Within the case studies various data collection techniques such as semi-structured interviews, Multiple Leadership Questionnaire and Personal Attribute Questionnaire have been used. The qualitative data collected are analysed using content analysis.

Although several research efforts have been conducted, on women managers and their leadership styles, there is a dearth of research focusing on the women managers and their leadership styles in the context of construction. Accordingly, this research will add a greater contribution to the existing body of knowledge in this area.

Built Environment Lifelong Learning Challenging University Responses to Vocational Education (BELLCURVE)

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Built Environment Lifelong Learning Challenging University Responses to Vocational Education (BELLCURVE) project is carried out by the University of Salford, UK in collaboration with Vilnius Gediminas Technical University, Lithuania and Tallinn University of Technology, Estonia. The mismatch between graduate skills and labour market requirements has been identified as one of the main factors behind graduate unemployment and employer dissatisfaction in the built environment sector. It has been realised that the educational centres have a major role to play in helping the employees to develop their skills and competencies which are required by the industry. In addressing these mismatches, BELLCURVE research project focuses on exploring the mechanisms associated with governance reforms in HEIs delivering Built Environment programmes across Europe with the intention to suggest that the Higher Educational Institutions (HEIs) need to be able to offer innovative curricula, teaching methods and training/retraining programmes which include broader employment-related skills along with more discipline specific skills. This requires a much clearer commitment by universities to lifelong learning opportunities. BELLCURVE, therefore, considers 'student engagement' as a continuous through-life process rather than a temporary traditional engagement limited by the course duration. The project intends to develop a framework to make HEIs more responsive to the labour market skills needs while promoting the lifelong learning agenda among HEIs. The developed framework will be validated in the context of different built environment sectors including disaster management. As an outcome of the research, recommendations will be provided on governance reforms for HEIs to become continuing education centres for graduates while responding to labour market skills needs.

Exploitation of Knowledge Mapping Benefits in the Facilities Performance Evaluation Process: A Conceptual Framework

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Previous studies in various fields have identified numbers of knowledge mapping tools and techniques that are widely used. Knowledge mapping tools and techniques assist with information and knowledge flow throughout an organisation. However, for a knowledge map to be useful it must serve the purpose for which it is intended. This imposes some constrains upon which map forms are suitable and for what purpose. In the same vein, facilities performance practices is developing and evolving with change in technology, business needs and users' expectation. This paper identifies various task in evaluating facilities performance, and explores the potential of knowledge mapping tools and techniques that might be of benefit to facilities management organisations. Most of what is put forward in this paper is based on an going research project as part of a PhD programme. The discussions are therefore grounded on a thorough review of literature accomplished as part of the research project. In addition, a conceptual framework for the exploitation of benefits of knowledge mapping in various stages of performance evaluation is presented and discussed. The paper concludes that facilities management organisations, by and large, are of the view that knowledge mapping is important and some have initiated and implemented tools and techniques of knowledge mapping in evaluating facilities performance. The study also revealed that the main benefits of knowledge mapping in evaluating facilities performance are: improvements in decision making process, problems identification and problem solving by providing quick access to critical information, knowledge gaps and island of expertise.

Trends and Future Direction of Facilities Management Practice in Malaysian

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Facilities Management (FM) is gaining increasing recognition as a significant contributor to the overall effectiveness of many organisations in developed countries. The review of literature on facilities management practice in Asia, specifically in Malaysia, however shows that the main focus on FM remains lingered between its traditional view of property maintenance management and support service activities. It is, arguably, far behind the current direction of innovation and strategic role of facilities management of their counterpart in developed countries. Generally speaking, facilities management could be said to be moving away from the content and provision of building and maintenance services, towards facilities managers' involvement in strategic and innovative ways of addressing primary business challenges. It could also be argued that the so-called "primitive short term cost saving approach" should give way to a knowledge-based approach in managing public as well as private facilities in Malaysia. Through a thorough review of extant literature, the paper primarily examines the role of facilities management in Malaysia based on user or client's expectations and offers a view of current and future trends from a Malaysia perspective. Implications of the current and future trends are presented and so are selected conclusions and recommendations for the benefit of the Malaysian construction industry and for academia.

The Application of Spatial Analysis in Resettlement Programmes

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An increasing number of disaster events cause a large number of people homeless annually around the world. Resettlement programmes have been implemented to relocate people from the hazard areas to other safe places. However, it appears that there are many problems in planning and implementing these programmes in terms of the lack of understanding of social characteristics of local people and their livelihoods including the poor provision of the basic essentials in many resettlement areas (e.g. infrastructure, and social services) Those problems have shown the lack of interaction between people and the provision of the basic essentials associated with the spatial aspects. In order to establish this socio-spatial relationship, feasibility of the application of spatial analysis techniques are used in this study. In this context, this research aims to provide a better understanding of resettlement programmes in terms of spatial interactions of re-settlers and the provision of the basic essentials. For this reason, the in-depth reasons given by re-settlers will be used to strengthen the results of the explored factors. The optimum balance between the explored utilisation will be eventually generated whilst presenting the virtual resettlement environment. This knowledge will provide the perspective dimensions to involving organisations to overcome several major problems associating with the spatial aspects these programmes.

Key words: spatial aspects, spatial analysis, resettlement programmes

Using Visioning Techniques to Design Inclusive Walking and Cycling Environments in 2030

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Key words: walking; cycling; infrastructure Contact: r.newton@salford.ac.uk

This poster reports on an innovative three-year research project to revitalise the quantity and quality of walking and cycling in the UK by 2030. Establishing the background to the EPSRC-funded research, it reports on current levels of 'active travel' in the UK and highlights the disproportionate use of motorised transport when distances are easily cyclable or walkable. Uptake of 'active travel' in the UK is improving, but not quite fast enough or with enough geographical consistency to capitalise on potential environmental, health and societal gains. The capacity for increasing levels is both substantial and achievable; as the success of long-term initiatives in The Netherlands demonstrates.

Reporting on the mixed methods approach of Visions 2030, which involves five research centres, the poster explains how the project imagines the future – and the steps to achieving it – by enabling participants to interweave their own stories with those of experts using interactive 3D computer modelling and other participatory tools. This is the first time that such techniques have been applied to the field of 'active travel'.

The project explores three future scenarios for the UK in 2030 in which substantially more people walk and cycle than in 2010, either by societal choice or because of changes 'forced' upon society. It does so using visions for an imaginary medium-sized city and five typical streetscapes. The poster shows these streets in both 2010 and 2030, showing similar buildings and physical dimensions but with enhanced facilities for 'active travel'. It explains how written stories support the visual narratives; drawing links between land use and transport planning, societal attitudes to transport modes, the integration of public and non-motorised transport and governmental incentives to lower reliance on cars.

A range of benefits are discussed in the conclusion, which recognises both quantifiable environmental 'gains' and a broader overall improvement to the 'civilised' urban realm.
See www.visions2030.org.uk

Going Outdoors: Falls, Ageing & Resilience (Go Far)

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Key words: falls; outdoors; built environment; older people

Getting outdoors is a key factor in preserving good physical, mental and social health in all age groups, but is particularly important for those aged 65 or over. Why then do many older people spend less time outside than they would like to, either for recreation, or for practical reasons? Research has shown that a fear of falling is one of the main barriers; falls being linked to decreased mobility and disability. Approximately one third of people aged 65+ fall at least once per year and, in earlier research by SURFACE, 15% of the 200 participants had stumbled or fallen outside in the last 12 months.

We know that outdoor falls are more common than indoor falls and that many of the associated physical risk factors appear to be preventable through both better design and maintenance of the built environment and a more detailed understanding of how individuals interact with it. However, due to a lack of standardised methods for evaluating environmental hazards and the needs of individuals, especially over time, outdoor falls have not been adequately researched. To address this gap, SURFACE Inclusive Design Research Centre has been funded by the Lifelong Health & Wellbeing MRC-led cross-council initiative to lead Go Far; a multi-disciplinary consortium of seven research centres. The objectives of the consortium's pilot study are to: consider the role of the outdoor environment in shaping health inequalities; explore older people's experiences of falling (and fear of falling) outdoors; develop and test innovative tools and techniques to evaluate the relationship between at-risk people and the outdoor environment; and develop a clear road map for future research in this area.

Go Far was awarded funding in April 2011 and commences in January 2012. SURFACE will be developing a protocol for using engineering tools to assess different built environment materials and, as lead partner, will be responsible for knowledge exchange and project management.

Bumps and Blisters: Tactile Paving and Older Pedestrians

Professor Dave Howard; Dr Laurence Kenney; Hamish MacLennan; Mohammad Faruk;
Professor Chris Nester; Rita Newton; Professor Marcus Ormerod and Dr Sibylle Thies

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Key words: tactile paving; outdoors; older people. Contact m.ormerod@salford.ac.uk

Tactile Ground Surface Indicator (TGSI) paving systems are a way of indicating, through touch rather than sight, the presence of pedestrian crossings, steps and other critical points on streets. While they are widely regarded as benefitting pedestrians with visual impairments, their 'age-friendliness' is somewhat less certain. This poster introduces the work of two research centres at the University of Salford who, together, are bridging this knowledge gap. Our work is part of a wider, EPSRC-funded research project called Inclusive Design for Getting Outdoors (I'DGO).

The multi-disciplinary I'DGO research picks up on two issues emerging out of a 2005 Health and Safety Executive report and seeks to find out if TGSIs affect the gait and behaviour of older pedestrians; having a knock-on effect on their mobility, health and independence. In the 'real world', we are looking at the extent and implications of incorrectly designed, sited and laid tactile paving and the potential of paving 'blisters' to pose a slip hazard while, in our laboratory, we are exploring queries over 'toe clearance' and step variability. Qualitatively, we want to understand how older people feel about using tactile paving and how this might influence their pedestrian behaviour. We also want to quantify the relationship between correctly-specified tactile paving, the biomechanics of walking and risk of falling.

The international study involves over 2,300 participants and innovative methods of research, including a slip resistance test, developed with the Health and Safety Laboratory, and an experimental walkway, fabricated by the Centre for Sustainable Technologies and Regeneration (STaR) at the University of Salford. As well as providing further details of these mixed-methods, this poster summarises all key findings to date, which we hope will be of use to tactile paving designers and specifiers and which have already attracted the positive attention of the UK Department for Transport. See www.idgo.ac.uk

Digital Cities

Professor Terrence Fernando

THINKlab, University of Salford, 7th Floor Maxwell Building, The Crescent, Salford, M5 4WT

THINKlab has developed an innovative ICT platform to aid urban transformation in creating healthier, wealthier and safer cities for the future.

An integrated 3D visualisation platform that:

- Creates a 'Mirror World' or integrated 3D city view utilising datasets and models provided by city stakeholders such as Transport Authority, Environment Agency, Police and Health Authorities, Ordinance Survey, VR/CAD companies.
- Enables application of a range of analytical tools such as data mining, spatial analysis, simulation and visualisation, to easily create and monitor scenarios that show the vision for local change and regeneration.
- Can be applied to many thematic areas such as urban planning and regeneration, green infrastructure and flood prevention, transport, emergency planning and crime prevention.

The technology is portable and can be used to transform local consultation events by bringing local visions to life and has the capacity to easily present a range of possible scenarios promoting sustainable/transformational development and help capture feedback to inform the decision making process.

This 3D visualisation platform provides powerful functions to support city and local authority leaders demonstrate their vision for change, creating the right conditions to build strong safe sustainable communities.

For more information visit www.thinklab.salford.ac.uk or call 0161 295 6579

An Evaluation of English and Scottish Local Government Asset Management Arrangements and Best Value

Malawi Ngwira

Centre for Property & Facilities Management, School of the Built Environment, University of Salford

There is now wide acceptance that a lack of asset management approach to the management of councils' operational properties can bring with it problems. Some of these problems include poor control of property running costs, economic underutilisation of property as they are not put to their highest and best use, and failure to recognise that property is a productive asset and not a free good. Increasingly, and to deal with the problems, councils have been adopting an asset management approach to property management. The approach is aimed at securing best value through effective and efficient management of property assets. Despite increased adoption of asset management, there are still some questions which this research is seeking to address.

Questions to be addressed

- The effectiveness of best value in securing service improvement
- The effectiveness of asset management in securing Best Value
- The effectiveness of the practice of asset management in English and Scottish councils
- Development of a model of asset management in securing BV
- Applicability of the asset management model in relation to both its application and securing BV

Methodology

In order to answer the above questions, a case study of a select number of councils in England and Scotland will be carried out. The study will evaluate the effectiveness of councils' asset management arrangements in terms of achieving best value. A model, based on asset management and best value criterion, will be developed for evaluating the effectiveness of asset management arrangements. Factor analysis and multi-criteria analysis techniques will be utilised to establish the principal criterion to be used in the model. The research will employ a mixed method approach for collecting data.

Future Practice of Children's Hospital Design through Participatory Approaches

Elham Sfandyarifard and Dr Patricia Tzortzopoulos

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This poster presents results of an ongoing PhD research, which aims to develop guidelines to help designers incorporate children's perspectives when designing children's hospitals. The poster discusses children's hospital design through participatory approaches and links it to the lean design literature. The research method includes a case study approach, in which the process of identifying children's preferences and considering these into the different stages of design is described. Data was collected through 18 semi-structured interviews. The interviews were recorded, transcribed and along with other documents analysed using content analysis. The result indicates that participation in a design process provides children with opportunities for voicing their view and ensures their requirements are available in all phases of the process. Such participation throughout the process enables requirements not to be lost when progressively transformed into design solutions. The poster also discusses how realistic is it to consult with children, and which approaches will help design decision making for future children's hospital design.

Two examples of children's contributions

The Potential Application of Spatial Planning in Jos Nigeria

Samuel Danjuma Wapwera

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Previous and recent master planning approaches (Greater Jos Master Plan) are obsolete and unable to curb the causes, nature and planning consequences of urbanisation (Oyesiku, 2004; Jiriko, 2007). This research seeks to evaluate the applicability of spatial planning to the Jos metropolis to address the physical planning problems. The research identifies and discuss the problems affecting Jos Metropolitan area including poor infrastructure, poor housing and urban sprawl/slum/suburban subsequently the effectiveness of the institutions involved in urban planning including: Jos Metropolitan Development Board (JMDB), Ministries of Urban Development (MUD), Lands, Survey and Town Planning (MLSTP) and the Lands Department of the six (6) Local Government Areas carved into the Metropolis is evaluated. The theoretical framework adopted is the institutional deficiency theory and institutional and organisational analysis. The methodology will involve both qualitative and quantitative in nature (combination of the two) and inference made from deductive and inductive approaches. The empirical research elements would involve surveys, cases studies, interviews, reviews of document and Focus group discussion and analysis using SPSS and NVivo. This study stands to provide a baseline data for the improvement and consideration of the adoption/ adaptation of spatial planning as a tool to solve the physical planning problems observed in most urban centres of the Nigeria.

Key words: Urbanisation, Urban, Sprawl/Slum/Suburban, Management, Metropolis, Spatial Planning

School of Computing, Science & Engineering

Simulating Transient Acoustic Scattering from Real-World Objects

Dr Jonathan A Hargreaves

Acoustics Research Centre, LG16 Newton Building

The human experience of sound is a complex and subtle process, driven by hurriedly changing events in the world around us. In contrast, the dominant analysis of sound considers behaviour in terms of time-invariant pure tones, a mathematically complementary approach, but nonetheless one that perhaps obscures transient aspects that are important to human perception. Time domain simulation methods deliver the transient sounds we hear directly, plus can potentially account for time-varying scenarios such as moving sources (e.g. a bus driving through a street canyon) or varying media (e.g. changing wind conditions in outdoor sound propagation), and also for non-linear behaviour. The demand for such data is increasing as the use of auralisation (the aural equivalent of visualisation) as a planning consultancy tool becomes more widespread. In addition, the Acoustics Research Centre has built two state-of-the-art Wave Field Synthesis systems, which each use up to 128 loudspeakers to render acoustic environments extremely accurately, but the modelling required to provide data for this is still under development.

Dr Hargreaves' research concerns the time domain Boundary Element Method (BEM), which can be used to accurately predict the scattering of sound in rooms. It reduces the problem of modelling the volume of air to one involving only the surfaces; hence the number of unknowns scales more favourably with problem size and frequency than it does for volumetric methods such as Finite Element Method and Finite Difference Time Domain (FDTD). Accurate representation of surface properties is crucial for obtaining realistic results, and the use of surface impedance is an established approach for single frequency problems. Equivalent time domain models have been published which couple FDTD meshes to digital filters, and herein the same will be investigated with time domain BEM. Accuracy is evaluated by comparison of results with the analytical plane wave pressure reflection coefficient and a frequency domain BEM with traditional impedance boundary conditions.

Acoustic Wind Speed Profiling using Coded Signals

Paul Kendrick and Sabine von Hünerbein

Acoustics Research Centre, University of Salford

Acoustic Radars have been used for a number of years to probe the lower atmosphere to measure wind velocities. Accurate wind speed profiles measured over long periods of time (months) are used to provide important data in the optimal location of wind turbines for energy generation. The relative portability and increased flexibility compared with fixed anemometers (usually on masts) makes these devices, also called SODARs (SOund Detection and Ranging), an attractive alternative. SODARs utilise the scattering of sound by atmospheric turbulence present in the lower planetary boundary layer. After propagating a pulse into the atmosphere and measuring the Doppler shift on the sound that is scattered back towards the ground, it is possible to estimate the radial velocity of the turbulence and thus the radial wind component at a number of ranges. By propagating pulses in three or more directions a wind vector can be calculated from the radial velocity components.

The data produced by current commercial SODAR instruments has a number of important limitations including range, range resolution, velocity resolution and data availability. The range resolution of these instruments is usually limited to between 10 and 20 m. This means that over the prospective height range of a wind turbine, there are a small number of available data points. SODAR signal processing is usually carried out using a form of incoherent averaging of Doppler spectra; either by averaging spectra or peak position averaging. This type of processing results in the range resolution and velocity resolution of the instrument are directly linked to the effective length of the transmitted acoustic pulse; a longer pulse means better velocity resolution but worse range resolution and vice-versa. This work investigates the use of coded signals coupled with a wideband matched receiver to increase the range resolution without reducing velocity resolution or range.

Noise Annoyance from Large Wind Turbines

Andrew J King and Sabine von Hünerbein

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This study aimed to determine if the current guidelines for assessing the annoyance caused by wind turbine noise (WTN) are appropriate for modern turbines that are much larger than those that informed the guidelines originally.   Tonal components were the focus in this line of investigation, after concerns that larger turbines create tonal noise at lower frequencies than smaller turbines, and that low frequency noise (LFN) can be more annoying than higher frequency noise. Audibility thresholds were taken from 20 subjects for several low frequency (LF) tones in a variety of masking noise levels, shaped to an average WTN spectrum as expected when outdoors in the garden and when indoors (façade attenuated). The thresholds generally rose as the masking level rose, whilst thresholds also decreased with increasing tone frequency. The thresholds were well predicted by using ISO 1996-2 calculations using the masking spectrum data.

Subjects also adjusted the levels of the tones until they judged them as equally annoying as the 180 Hz tone at a fixed level. Once individual thresholds had been accounted for, no effect of frequency was found on annoyance ratings. Nor was there any significant effect of masking on annoyance ratings. Only raising the 180 Hz tone level above masking had an effect on annoyance ratings; the other tones' levels did not have to be raised as much as the reference to remain equally annoying. These findings suggest that audibility constrains annoyance for tone frequency and masking levels, but that there is a possibility that annoyance increases more rapidly than the dB scale.

Complimentary to this, subjects also rated recorded WTN noise from two different sized turbines by adjusting the level of traffic noise (TN) until equally annoying. Analysis showed that the recording of the smaller WT had more LFN. Subjects adjusted the TN to higher levels for the smaller WT than for the larger WT. This suggests that greater LFN increases annoyance, but also highlights that larger WTs may not always produce greater LFN.

Calculation of Noise in Residential Environments

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The DEFRA funded project "Human Response to vibration in residential environments" investigates relationships between human response in residential areas, primarily in terms of annoyance, and combined effects from exposure to vibration and noise. This paper focuses on the results from the analysis of noise exposure in this study, in particular from construction work and railway traffic. The exposures for railway traffic noise sources were obtained and calculated according to a routine based on "Calculation of Railway Noise (1995)" and "Additional railway noise source terms for 'Calculation of Railway Noise (2007)'". On the other hand, exposure from construction work was calculated based on measurements of the various sources at different locations. This paper compares noise exposures from those sources in terms of level of noise, frequency content, distance from source to receiver, and the environment in which residents are exposed to noise and the reported annoyance. To conclude, the paper shows the relationships between noise exposure from the different vibration sources and annoyance. [Work funded by the Department for Environment, Food and Rural Affairs (Defra) UK].

Community Reaction to Railway Vibration at Different Times of the Day

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A number of studies have shown different sensitivities to noise exposure for day, evening and night, in particular for railway and air traffic. L_{den} has been accepted as a good indicator for predicting noise annoyance. In the same way, time of day is considered here as a factor affecting the impact of vibration in communities as measured by annoyance. The current British Standard BS 6472-1:2008 recommends using the Vibration Dose Value (*VDV*) as a vibration descriptor. VDV takes into account the number of events and their duration, and recommends limit values for day and night levels. However, there are no penalties applied in its calculation for different times of the day. This paper presents data from case studies (N=931) comprised of face-to-face interviews and internal measurements of vibration exposure. The aim of the present paper is to identify the times of day during which vibration causes the greatest annoyance, to measure the differences between annoyance responses for different time periods, and to obtain estimates of the values of the time-of-day penalties. In addition, information about nighttime responses (annoyance and sleeping disturbance) is presented. This work will be of interest to policy makers and environmental health practitioners involved in the assessment of vibration complaints, as well as to planners and acoustic consultants involved in the design of buildings. [Work funded by the Department for Environment, Food and Rural Affairs (Defra) UK].

The Use of Complex Instantaneous Sound Intensity for Characterisation of Early Reflections in Small Rooms

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The sound field in rooms of smaller dimensions used for music reproduction is characteristically different from that found in larger rooms for music performance such as auditoria. However, most of the knowledge and acoustic measures defined to describe the sound field in large spaces are commonly evoked to predict the performance of small rooms. It is now becoming evident that this practice leads to flawed concepts, which in turn influence the quality of products emerging from these facilities. This project is focused on developing a method for the characterisation of temporal and spatial transient sound intensity used to describe the sound decay in small rooms. By combining its orthogonal components, it is possible to extract factors such as direction, time of arrival and strength of early reflections. An energetic approach using diffuseness estimates is used to describe on the latter part of the measured decay. These factors are then mapped to allow a description of their evolution over the room decay. The outcome is to be able to measure a room and be able to define which are the reflections that are contributing to the acoustic quality of the space and which need to be acoustically treated to improve sound quality in critical listening spaces. Finally, the measured data is then weighted for in light of the current state of the art knowledge for perception of reflected energy within rooms.

A Flexible New SODAR Design for Chirped Signals and Conformable Beam Forming

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SODARs are wind profiling acoustic RADARs. Current SODAR designs would benefit from improved signal-to-noise (for high noise or low thermal contrast environments) and from more flexible beam forming (in the presence of tall hard scatterers). We describe a new SODAR design that allows complete gain and phase control of each individual speaker of a 32-speaker transmitter, and independent sampling of each microphone in a 32-microphone receiver. This SODAR is strictly bi-static, and could be used as such, but the intent is to develop first the methodology for an optimised (pseudo) mono-static instrument, where the transmitter and receiver are placed side by side. A group of four inexpensive 24-bit sound cards are used, each having 8 inputs and 8 outputs with 96 kHz sampling rate on each channel. These sound cards are synchronised so that there are negligible phase delays in sampling. The entire system is controlled via MATLAB, but could be driven from other code such as LABVIEW or C++. The software is thus compact, readable, and very easily modified. We will show some first field results. We also describe the proposed chirp signal processing and the beam optimisation strategy which we propose to use to mitigate against unwanted reflections from fixed objects ("fixed echoes"). Finally, we discuss the likely improvements in wind profiling accuracy and temporal resolution from these developments.

Results from testing a system calibration transponder with two different SODARs

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Wind profiles measured using SODAR instruments are subject to several uncertainties. One method for exploring uncertainties created within the SODAR system involves the use of a transponder system where the SODARs signal is recorded by a microphone and used to create an echo signal which is played back to the SODAR. This system has been tested with two different SODARs in an outdoor environment with methods employed to reduce the affect of background noise and real atmospheric echoes. Comparisons are made between the two sets of results. This allows exploration of how the different processing features of the SODARs affect the measurements made.

Bistatic Sodar Prototype for Use in Wind Energy Applications

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Representative wind estimates for wind turbine siting are difficult and prone to error both from simulations and from direct measurements. Recently the use of wind profiling devices such as SODARs and LIDARs have been explored as an industry standard. Traditional SODARs transmitters and receivers co-located. This arrangement makes the scanning of three separated volumes necessary which in complex terrain leads to a wind speed error of typically up to 5%. A new bi-static SODAR has been designed which uses a single central vertical transmission and three distributed microphone array receivers with scanning and therefore profiling capability. Field results are given from a prototype. Fourier transform delay methods are applied to data sampled from each microphone to retrospectively scan in angle and follow the transmitted pulse. Advantages of sampling a narrow atmospheric column, rather than distributed volumes are discussed. The measured wind profile demonstrates the potential of that design for successful more accurate measurements in mountainous terrain with the aim of improving wind turbine siting.

Modified Location Aided Routing Protocol for UWB MANET

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The Mobile Ad hoc Network (MANET) has become an increasingly popular area of research during the last decade. The main goal of the MANET will be to seamlessly connect mobile devices anywhere and anytime. Recently, the introduction of Ultra-Wideband (UWB) technology has become a promising candidate to support MANET; research in this area has been extensive over the last few years due to its powerful capabilities such as the large Band Width (BW) available and the high data rates possible. Routing protocols enable mobile hosts (or nodes), such as laptops and cellular telephones, the ability to communicate to each other, the design of routing protocols has encouraged researchers to investigate and develop new strategies that establish and maintain connections between mobile nodes. The main aim of the research is to design and implement an efficient routing protocol for MANET based on UWB technology. The Location Aided Routing (LAR) protocol, scheme 1, is first considered in order to satisfy the requirements of the proposed routing protocol, and combines the advantages of the request zone in LAR and the dynamic extended zones in the modified schemes of LAR.

The main objectives of the research is to reduce the power consumption of the mobile nodes (thus increasing the lifetime of network), reduce the network overhead, and increase route reliability. Analytic model is represented to prove the validation of the protocol in addition to simulation results by means of QualNet (network simulator) which show that the new protocol outperforms both the AODV and LAR1 protocols, it increases the life time of network, produces less overhead, and also provides the highest throughput.

The Use of Smart Antenna techniques for UWB Wireless Personal Area Network UWB-MIMO WPAN

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The smart antenna systems had come a long way in the last few years and represented a viable solutions to the rapid increase in data rate demand by current and future wireless system applications. . In this work, the aim is to produce an effective model for Ultra Wide Band Multiple Input Multiple Output Wireless Personal Area Network (UWB-MIMO WPAN) that increases the data rate, optimises the current algorithm used in wireless personal area networks and reduce the overall complexity of the system. The model will try to develop novel techniques in the use of homogeneous and heterogeneous antennas so as to minimise the mutual coupling, transmitting power, processing time and decrease the minimum distance between spatial elements. The project will first investigate the ultra wide band channel extensively so as to realise a suitable model for the intended design. At this stage all the reverent statistical models and the relevant parameters that have governed ultra wide band communication will be analysed. In the second phase of the project smart antennas and their Radio Frequency (RF) modules will be investigated. The simulation will try to accommodate some of the practical challenges faced by all antenna and RF designers in an ultra wide band environment. The third stage of the research will integrate the MIMO design in the ultra wide band channels under test. The following stage is the optimisation stage where additional demands and requirements would be catered for as well as improving the system design. The fifth stage would involve validating the smart antenna techniques by comparative tests to existing approved practical models. Finally a contribution to the wider community will be made and a presentation will be facilitated where the project outcomes will be presented to the scientific community. The impact of the research would be the precise understanding of the radiation pattern in the 3.1 – 10.6 GHz frequency band and thus the ability to increase the transmission rate in current and future commercial applications with multiple antenna systems in an UWB-WPAN.

Reducing Handoff Latency Time for Multicast Mobility Services

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Today's smartphones are far more than mobile phones. They are providing an increasingly sophisticated multimedia capability and link through the internet easily. There are statistics which show that people are average spending 2.7 hours per day on their smart phone such as connecting on social networking sites, checking personal email and watching online video. However, there is a problem and this occurs when a smart phone moves. Services can be interrupted when this handoff process occur between networks or cells/zones. This research is focusing on the way to maintain the handoff process on IPv6 (Internet Protocol version 6) wireless network environments and between IPv6 and 3G (Third generation, UMTS) networks. In the first stage, we will be modifying Mobile IPv6 (Mobile Internet Protocol version 6) to solve the problem of mobile node mobility by getting a Care of Address in advance. This method can help the network keep route of multicast tree in advance before the mobile node moves. For multimedia applications, we chose to study multicast delivery on IPv6 networks. Therefore, we have to modify many protocols for instance the MLD (Multicast Listener Discovery) protocol on a LAN (Local Area Network), which is encapsulated in ICMPv6 (Internet Control Message Protocol version 6) protocol. The functionality of MLD protocol is managed and maintained the member of multicast group such as join/prune messages. Moreover, we have to modify PIM (Protocol Independent Multicast) protocol within multicast domain for response about multicast routing and keep up to date the status of Active/Standby link within the network. In additional, we have designed to use ICMPv6 protocol for send the control messages within the framework. The framework is being simulated on OPNET Modeler 16.0 for evaluate the performance in term of handoff latency time and the number of packet loss.

A Multi-Armed Bandit Approach to Cost-Sensitive Learning

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Decision tree learning, one of the main methods of learning from data, has been applied to a wide range of problems including medical diagnosis, drug design and credit scoring. Aimed at producing low error trees, in recent years it has been noted this is not adequate as real-world problems have costs associated with them. Increasingly important is the ability to take into consideration misclassification costs, costs of obtaining the data and economic constrains.

An empirical comparison reveals several weaknesses in cost-sensitive decision tree algorithms. The main ones are difficulties dealing with multi-class problems, rare events, unbalanced class distributions, large number of attributes and/or attribute values and with extreme misclassification costs, high test costs or large ranges of misclassification costs.

In order to overcome these weaknesses, a new approach is under development, which combines Game Theory with the decision tree induction process. The Multi-armed Bandit Algorithm is a process to solve problems where there is a trade-off between exploring potential strategies and exploiting the best strategy found. This technique has been used to solve problems such as delivering parcels across a delivery network, allocation of funds to projects where the benefit may yet not be known or clinical trials.

A new algorithm, using the multi-armed bandit framework is being developed and investigated. In order to adopt the multi-armed bandit framework, the algorithm employs look-ahead techniques to explore future splits on data. The multi-armed bandits are potential roots and paths chosen at random with the total expected cost calculated for each bandit. The best strategy is the root consistently producing the lowest total expected cost and is then exploited by partitioning the data on this root to induce the decision tree.

Keywords: cost-sensitive learning, decision trees, multi-armed bandits, data mining

Swarm Robotics for Decision-Making Process under Risk

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The term swarm robotics approach has been inspired from the field of artificial swarm intelligence (SI), as well as the biological studies of birds, bees, ants and other fields in nature, where swarm behaviour has been occurred. The swarm robotics approached consist of multi-robot (agent) systems which involve large numbers of simple, inexpensive, scalable and efficient robots that working together to explore and locate a specified target (s) in the environment that is difficult or impossible for a single robot to achieve due to their constraints. The decision process that have been used in the literature to model individual agent behaviour are generally found to be inadequate when the phenomena of uncertainty and risk are factored into process; and these models are usually incapable of fully emulating actual human decision-making behaviours under risk and uncertainty. This work proposes a significant modification to agent reasoning processes employed so far in conventional swarm robotics. We show that by endowing each agent with some descriptive behaviour from the field of psychology named Prospect Theory (PT).

The proposed algorithm has been used to locate the specific target (s) and to improve the efficiency of global searching procedures for swarm robots in high risk environment such as landmine, fire, chemical, nuclear waste and toxic hazard into the search area. Analysis and performance of the swarm robots behaviours has been verified by performing a real test. The new proposed swarm algorithm presents a real advantage from an engineering perspective: better solutions, broad applicability, more robustness and less computational requirements.

Development of Traffic Simulation Model to Evaluate the Capacity of Weaving Sections

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Weaving sections have proved to be one of the bottleneck locations for many motorway sections mainly due to the intensive number of lane changes occurring at such areas. Simulation models have proven to be the most suitable methods of evaluating weaving capacity. However, many of the existing simulation models suffer from certain limitations such as the unrealistic representation of driver's behaviour in terms of the longitudinal movement (car-following algorithms) or the lateral movement (lane changing algorithms). Moreover, the field data used for the calibration and/or validation processes might be limited in terms of the sample size used or in not correctly interpreting the data. Therefore, this study has been aimed at developing a simulation model: starting with the car-following and lane changing algorithms and ending by calibrating and validating this model with field data from a variety of sites. The data has been gathered for more than 50 hours of video recordings to cover more than seven sites of different configurations. The developed model has been compared with other traffic simulation software such as the S-Paramics which is widely used in industry. The results suggest that the developed model gave better results compared with S-Paramics in mimicking reality. Moreover, the results from this model have been compared with the methods used by the American Highway Capacity Manual as well as other models used in the USA such as INTEGRATION. The results suggest good agreement with these models. The developed model will help in studying the effect of each factor that influences capacity of weaving sections, such as the volume ratio (VR) the length of weaving section and the ratio of heavy good vehicles (HGVs).
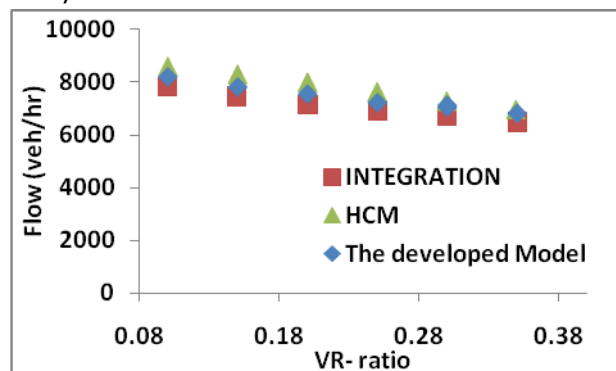

Figure 1 Weaving movements.

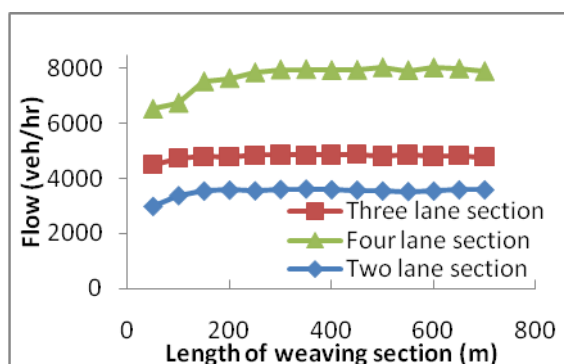**Figure 2** Comparison with other models.
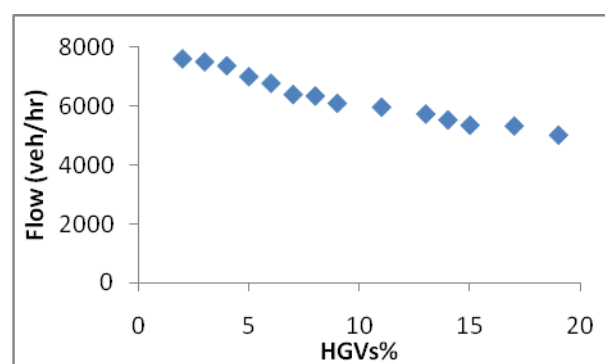

Figure 3 Effect of weaving length.

Figure 4 Effect of HGVs on the capacity.

Testing the Effectiveness of Ramp Metering Using Traffic Micro-Simulation

Jalal Al-Obaedi and Saad Yousif

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Traffic simulation models have increasingly been applied in recent decades in order to evaluate the effectiveness of traffic management controls because of their ability to test different scenarios/alternatives without the need to cause real disruption on site. In this research work, a new traffic micro-simulation model for motorway merge sections has been developed. The developed model considered the multi-decisions of merging traffic when a driver, for example, accepts the lead gap and rejects the lag gap. The cooperative nature of drivers is also considered when motorway drivers allow others to merge in front of them either by decelerating or shifting to other lanes (yielding) in the vicinity of motorway merge sections.

The developed model has been applied in testing the effectiveness of ramp metering (RM) controls. The results reveal the benefits of RM in reducing time spent for motorway traffic (TTSM) but it significantly increases the time spent by the merging traffic (TTSM). The overall benefits of implementing RM in reducing total time spent (TTS) is limited in situations where the sum of motorway and merge flows is just over the capacity of the downstream section.
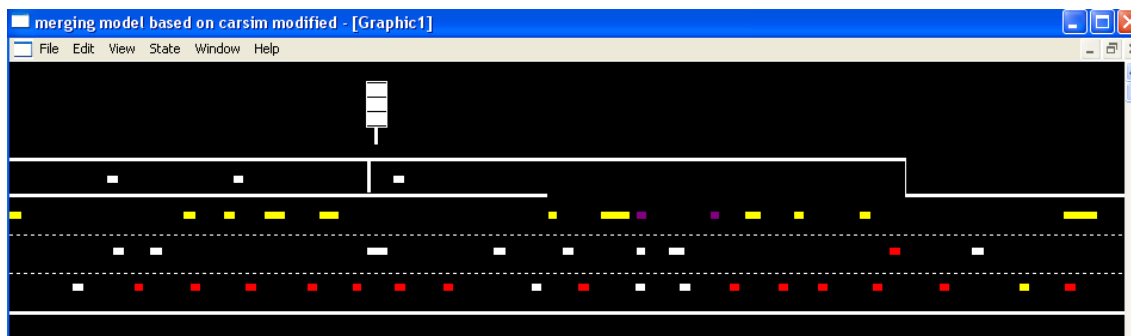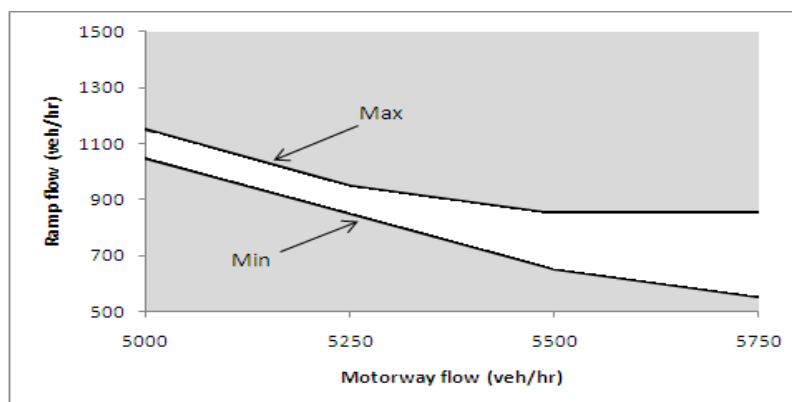

Figure 1 Typical screen from the model

Figure 2 Ranges of flows at which ramp metering is effective in reducing the TTS

Keywords: Merge traffic; ramp metering; micro-simulation, capacity

Impacts of Residential Relocation on Travel Behaviour Change: Manchester City Centre

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National statistics show that motorised road transport is still the major contributor to climate change and energy consumption challenges in the UK. Trends indicate that advanced technologies, such as electrical hybrid and fuel efficient vehicles, could solve part of the problem. However, it is more desirable in contrast to adopt more friendly-environmentally travel choices in order to reduce the evidence-based increase in car use (see Fig.1). Bearing in mind that people's short-term travel decisions, such as mode choice and trip distance, often depend on their medium or long-term ones, like car ownership and job/residence location, the objective of this research is twofold. The first is to examine the change in travel behaviour of people who have recently moved to live in Manchester city centre, while the second one is to explain this behaviour change after controlling for socio-economic differences.

The research will attempt to test the hypothesis that living in mixed land-use locations with a wide range of options of travel modes, like city centres, would motivate people to reduce their car-dependency (see Fig.2). The source of data is the household travel survey using self-completion questionnaires which will be conducted in the Manchester city centre area. Those who have recently moved to city-centre living will be selected from a wider sample of city centre residents and asked to describe their previous neighbourhoods' characteristics by selecting one of six different residential neighbourhood descriptions. In addition, they are asked to illustrate their main mode of travel for different trip purposes (commute, shopping and leisure) before and after moving. Using these quasi-longitudinal data and rigorous statistical quantitative analyses, the research will investigate the associations between land use characteristics and the change in travel behaviour.
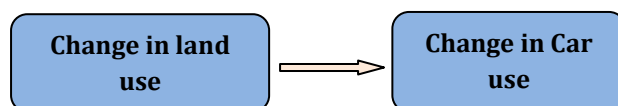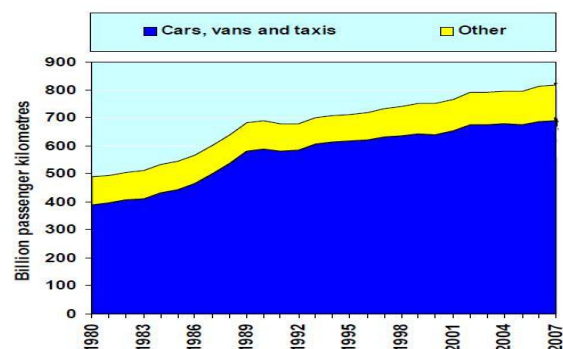

Fig.2: Research hypothesis

Fig.1: Passenger car travel trend in GB (DfT, 2009)

Laser Triangulation and Robot Integration Applied to the 100% Inspection in the Quality Control of Manufacturing Process
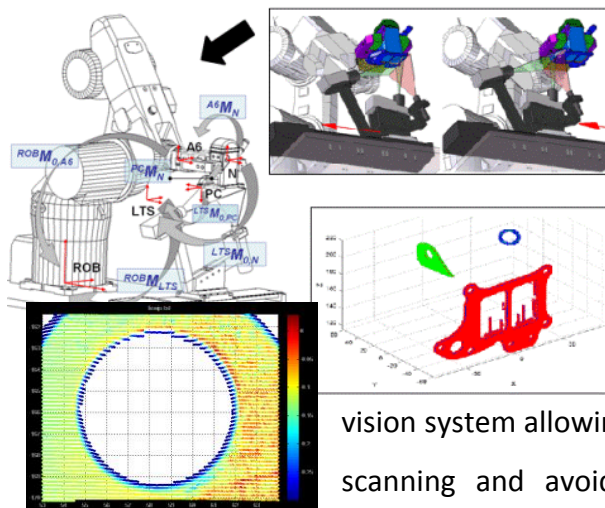
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A model for measuring complex geometry parts, manipulated through a robot, using vision system consisting of a laser triangulation sensor and a motorized linear stage (MLS) is presented. An automatic simple module for long term stability improvement has been developed for the vision system allowing the sensor set up, including the MLS, for the scanning and avoiding external measurement devices. In the measurement model the robot works positioning the parts with high repeatability along the measurement range of the vision system, which is responsible for the measurement. Thus, the whole system is not affected by the robot positioning, except those due to the lack of static repeatability. For the indirect link between the vision system and the robot, the original model developed needs only one first piece measuring as a "zero" or master piece of well-known dimensions. The strategy proposed presents a different approach to traditional laser triangulation systems on board the robot in order to improve the measurement accuracy, and several important cues for self-recalibration are explored using only a master piece. The experimental results demonstrate the technique and the final 3D measurement accuracy. The calibration of the MLS with a laser interferometer and the calibration of the robot with a laser tracker have been also carried out.

Multi Objective Particle Swarm Optimization
with Prospect Theory

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Multi- Objective Problem (MOP) can be found everywhere in nature and we deal with them on our daily life so often without realizing like determine efficient transportation mode considering distance covered and energy used. Also MOP is finds in engineering, science, business, economics, etc.

Recently, new heuristic inspired from the social behaviour of group of birds called Particle Swarm Optimisation (PSO) is used to solve MOP, where the behaviour of each particle is decided mainly by its memory which is the best position the particle ever visited called (*PBest*) and, the position of the leader which can be chosen according to the best position found so far by the swarm called (*GBest*). However, PSO could often easily fall into local optima. Thus PSO still need to incorporate with explicit mechanism in order to improve convergence to the true Pareto front as well as produce a well distributed Pareto front.

In this work a new variant of PSO algorithm is designed, that could be used to solve MOP through introducing new strategy for selection *GBest* and using the risk factor as a criterion evaluate particle's performance during the evolutionary processing.

The proposed method uses also a descriptive theory of decision making under risk called Prospect Theory (PT) to measure the risk for each particle, selecting a subset of particles with less risk to be the leaders for the entire swarm, and finally to decided the new movement to the swarm. This can offering more intelligence to particle's movement, maximize the number of solutions found and guide the search toward the true Pareto front, and to generate a well-distributed Pareto front.

Assessment of the Relationships between Sustainable Flood Retention Basin Variables and Catchment Characteristics

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With frequency and intensity of rainfall events increasing due to climate change over the last century, as well as with a 3.4% rise in urban and artificial land cover across Europe between 2000 and 2006, it is widely accepted that there is an elevated risk of flooding. Increasingly, it is recognised that the use of small infrastructure assets such as sustainable drainage systems alone to combat flooding has the risk for technological lock-in and is likely to be less effective than large-scale integrated approaches to manage flood risk. It is also clear that novel and timely sustainable management techniques such as Sustainable Flood Retention Basins (SFRB) need to be used alongside engineered flood defences. Sustainable Flood Retention Basins are aesthetically pleasing retention basins that are predominantly used for flood protection adhering to sustainable drainage and best management practices. Most reservoirs are a specific type of SFRB. The reservoir water level can be actively managed to capture runoff during a storm and release it gradually thereafter to protect urban areas located downstream from flooding. A rapid SFRB assessment tool has been developed to classify and categorise water bodies. Previously, about 55 SFRB characterisation variables have been collected for hundreds of sites located in Scotland and Germany. Here however, most SFRB sites are of rural nature. Therefore, a new data set of predominantly urban SFRB sites is currently being collected for Greater Manchester. A SFRB Guidance Manual for the determination of variables reflecting urban and rural characteristics is currently being developed. Once the data set for Greater Manchester is complete, comparisons will be drawn between all three SFRB data sets. Moreover, the data sets will be compared with water quality data partly measured and partly obtained from environmental agencies to identify relationships between upper and lower catchment characteristics and SFRB characterisation variables.

Spatial Distribution of Dam Failure Hazard in Greater Manchester

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During the period between 2000 and 2009, over 3 million people were affected by floods in Europe. In England alone, about 2.4 million properties are located in areas at risk of river and coastal flooding, whilst 3.8 million properties are at risk of surface water flooding. It is envisaged that climate change would further increase the intensity and frequency of floods. The EU Flood Directive 2007 requires member States to ensure that flood hazard maps and flood risk maps are completed by December 2013. As a result, there is an urgent requirement to develop flood risk management and assessment tools. Sustainable Flood Retention Basins (SFRB) are adaptive structural measures to control runoff in temperate climate. An SFRB is an aesthetically pleasing retention basin predominantly used for flood protection adhering to sustainable drainage and best management practices. A classification model was used to classify approximately 100 SFRB sites in Greater Manchester. The following six types of SFRB were defined: Hydraulic Flood Retention Basin, Traditional Sustainable Flood Retention Basin, Sustainable Flood Retention Wetland, Aesthetic Flood Retention Wetland, Integrated Flood Retention Wetland and Natural Flood Retention Wetland. A scoring system was then used to estimate dam failure hazards for all water bodies enclosed by dams. Considering that it is very costly to estimate the hazard of dam failure, regression and neural network models were developed to predict this variable with a few easy-to-determine and low-cost variables. Findings show that neural networks provide more reliable results compared to regression models. The data obtained are used to produce a dam failure hazard map of Greater Manchester. This map is a valuable tool for decision-makers such as planners and water resources engineers when they discuss where to locate and how to manage dam infrastructure in the future.

Modelling the Length-History Dependence of Muscle for FES Applications Using a Multiple Motor-Unit Approach

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1. Introduction

Skeletal muscle force production is history dependent, yet this aspect of muscle modelling has received little attention in FES control studies. Force depression following shortening and force enhancement following stretch can reach values of up to almost 50% of the corresponding isometric muscle force. Therefore, if not properly accounted for during the design, it is reasonable to assume that this effect may adversely influence the performance of FES controllers [2].

The Model

In our previous study [1], we developed a Hill-type multiple motor-unit muscle model that accounts for the activation history during FES control. We have extended this by incorporating the model of force depression and enhancement proposed by Forcinito, M., et al. [3] for a fully activated muscle treated as a single motor-unit. Based on their model, we have included an elastic rack in parallel with each motor-unit. When a motor-unit is recruited, its elastic rack is engaged and thus the passive force produced by that motor-unit will be a function of its change in length since initial activation.

2. Discussion

We have incorporated force depression and enhancement in our multiple motor-unit muscle model, further improving the way in which the activation-history and length-history are accounted for. By correctly modelling the effects of continuously changing recruitment and length, as seen during FES control, we hope that better FES controllers can be designed.

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Performance Evaluation of an Integrated Constructed Wetland Treating Domestic Wastewater

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The performances of a new and a mature integrated constructed wetland (ICW) system treating domestic wastewater were evaluated for the first time. The new ICW in Glaslough (near Monaghan, Ireland) comprises five wetland cells and the mature system in Dunhill (near Waterford, Ireland) comprises four cells. The performance assessment for these systems is based on physical and chemical parameters collected for one year in Glaslough and five years in Dunhill. The removal efficiencies for the former system were relatively good if compared to the international literature: biochemical oxygen demand (BOD, 99.4%), chemical oxygen demand (COD, 97.0%), suspended solids (SS, 99.5%), ammonia-nitrogen (99.0%), nitrate-nitrogen (93.5%) and molybdate reactive phosphorus (MRP, 99.2%). However, the mature ICW had removal efficiencies that decreased over time as the Dunhill village expanded rapidly. The mean removal efficiencies were as follows: BOD (95.2%), COD (89.1%), SS (97.2%), ammonia-nitrogen (58.2%), nitrate-nitrogen (-11.8%) and MRP (34.0%). The findings indicate that ICW are efficient in removing BOD, COD, SS and ammonia-nitrogen from domestic wastewater. Both groundwater and surface water monitoring results indicated that the ICW system in Glaslough had neither polluted the groundwater nor decreased the water quality of the receiving watercourse. All nutrient concentrations for the receiving watercourse were lower downstream than upstream of the ICW system outlet. Nutrient removal within the open ICW system is complex due to water, sediment, plant and microbial interactions, so it was impossible to come up with consistent nutrient balances. The novel use of ICW to treat domestic wastewater is a valuable and appropriate technology. It is especially suitable for small communities in both developed and developing countries. The absence of an artificial liner made of materials such as expensive plastic or concrete makes the ICW technology affordable. However, any ICW system should be mature and sufficiently large to avoid potential groundwater contamination.

Geostatistical Assessment of Wetlands that can be Used as Sustainable Adaptive Structural Measures for Diffuse Pollution and Flood Risk Management Planning

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The treatment of diffuse pollution with wetlands has become more popular in recent years. Severe rainfall events leading to increased runoff from fields and roads have become increasingly common in Europe. There is a recent interest in combining wetland systems with flood defence engineering works, which are capital intensive and can be limited by land availability. In Scotland, there are a relatively high number of former and current drinking water reservoirs, which could contribute to diffuse pollution control, and flood management and planning. Reducing the rate of contaminated runoff from the upper reaches of a catchment will reduce the volume and peak flows of flood events downstream, thus allowing flood defences to be reduced in size, decreasing the corresponding capital costs. A database of 500 potential sustainable flood retention basins has been developed for Scotland. The research shows that the majority of small and former drinking water reservoirs are kept full and their spillways are continuously in operation. Utilizing some of the available capacity to contribute to diffuse pollution and flood control could significantly reduce the costs of complying with European Union directives. A geostatistical data analysis has shown that ordinary kriging can be successfully applied to estimate numerical values for all key diffuse pollution and flood control variables everywhere in a study area. However, the mean prediction errors were relatively high for the ordinary kriged variables associated with some variables such as contaminated flood water volume. Moreover, the probability that certain threshold values relevant for diffuse pollution and flood control managers are exceeded can also be calculated by using disjunctive kriging. The principle value of this analysis is a clear and unambiguous spatial assessment of the diffuse pollution and flood control potential predominantly based on the variables Total Relative Pollution, Urban Catchment Proportion and Managed Maximum Flood Water Volume.

Battle of Water Network Model Calibration

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Water distribution system (WDS) simulation models are widely used by planners, water utility personnel, consultants and many others involved in analysis, design, operation or maintenance of water distribution systems. In order to make a hydraulic model useful, it is necessary to calibrate it first. Calibration of WDS models consists of determining physical and operational characteristics of an existing system.

This paper presents the calibration results of the C-Town network obtained using an artificial immune algorithm called Clonal Selection Algorithm (CLONALG).The calibration problem was formulated as determining the network model parameters such that the best match between measured and predicted data is obtained. The model parameters include pipe roughness values, valve closures, nodal demands, pump controls and valve settings. The artificial immune algorithm used in this work evolves a population of candidate solutions using the clonal selection principle. The proposed model was applied to calibrate the C-Town network. The network calibration parameters obtained, when input into the C-Town hydraulic model, produced reasonably good match between the predicted and the observed tank water levels and pump station flows. Various performance measures were calculated and presented in the paper.
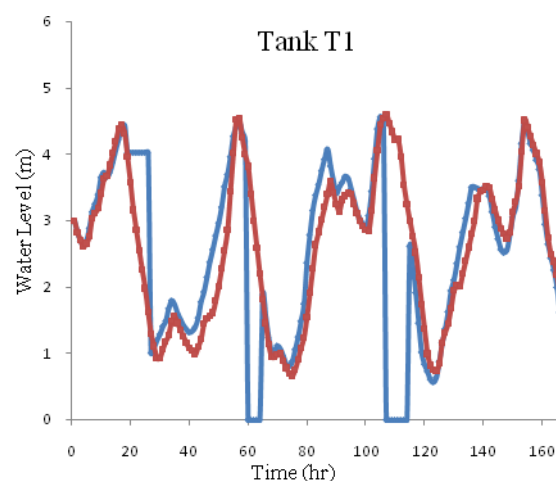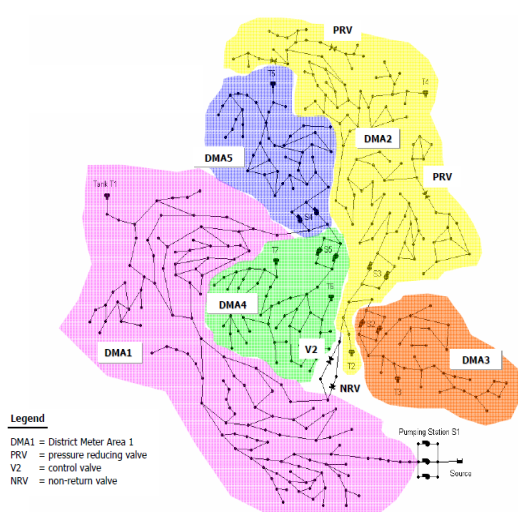
Modelling and Predicting the Hydraulic Properties of Unsaturated Porous Media

Yu Wang

Engineering 2050 Research Centre and Materials & Physics Research Centre
Room 111 Cockcroft Building

The water flow in unsaturated porous media is an important factor in environmental science and engineering. It is a fundamental phenomenon that relates to many problems and concerns, such as the underground processes of water dispersal, heat transfer, and nutrient and pollutant transmission It also has significant influence on the physical properties and mechanical behaviours of the soils under varied hydraulic, thermal and mechanical circumstances. The hydraulic properties, such as water retention characteristics, hydraulic conductivity or hydraulic diffusivity, are very important parameters required in the analysis of the flowing processes.

Both the water retention characteristics and the hydraulic conductivity of unsaturated porous media have an inherited relationship related to the pore size distribution of porous media. In this work, a recently developed physico-chemical water retention model by the author is coupled with a traditional analytical hydraulic conductivity model. Because the two models are established under the same conceptual framework in the physical understanding and simplifying of the principles of the water flow in unsaturated porous media, the coupling generates a fundamentally uniform analytical description for the unsaturated hydraulic conductivity. The final model has been tested on different soil samples. The results show that it is successful in predicting experimental measurements.
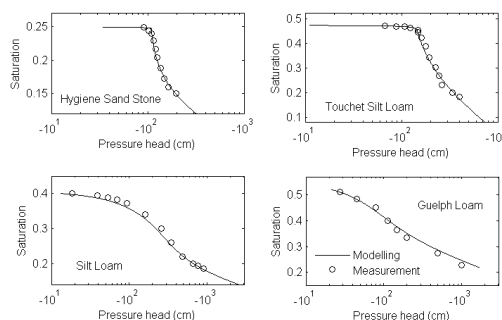
Predicted water retention characteristic of unsaturated soils
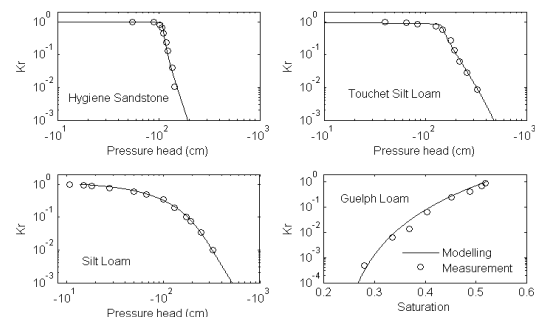
Predicted relative hydraulic conductivity of unsaturated soils

T Neutronplot – Visualisation Software for Poly-CINS Data

A M Bailey, D L Roach and D K Ross

Materials & Physics Research Centre, Room 114 Maxwell Building

This project is concerned with the interpretation and analysis of poly-crystalline, coherent, inelastic, neutron scattering (poly-CINS) data. This method of neutron scattering uses powder samples of material. Poly-CINS gives information on phonon modes, in the form of phonon dispersion curves. This leads to data sets that are very large and historically difficult to interpret. Because of these difficulties most experiments on powder samples use incoherent neutron scattering techniques, which give phonon density-of-states information. Due to the popularity of incoherent scattering most generally available software analysis packages are designed with incoherent scattering in mind. This project is therefore devoted to creating and improving tools for poly-CINS. Some advances in interpreting poly-CINS have been made recently with the advent of the Scatter code by D. Roach (1). To this end a program, Neutronplot. is being created to enable the easy viewing and analysis of plots of neutron scattering data.

Neutronplot should be user friendly, and it will aim to appeal to all members of the neutron scattering community. It can been seen as a useful addition to GULP and the Scatter code, and hopefully an independent tool in its own right for use by both experimental and theoretical neutron scatterers. It has been developed using MATLAB and has a Graphical User Interface (GUI). Most operations are performed at the click of a button to enable ease of use. Neutronplot has been written so that each operation performed is a separate MATLAB function. This should make it easy to add new functionality and update the existing code.

Currently Neutronplot supports four different types of data input. The LAMP output data files, the Mslice files, raw data from the NEAT facility in HZB, and theoretical data from the Scatter code

[1] Daniel Lee Roach. Computational Investigations of Polycrystalline Systems Using Inelastic Neutron Scattering Techniques. PhD thesis, School of Computing, Science and Engineering, 2006.

Propagation and Stability of Two-Colour Spatial Optical Solitons

C Bostock, J M Christian and G S McDonald

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Abstract removed for reasons of copyright

Relativistic & Pseudo-Relativistic Connections in Optical Pulse Propagation

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Abstract removed for reasons of copyright

Properties of CuInSe$_2$ and Mo Thin Films Produced by Pulsed d.c Magnetron Sputtering for Solar Cell Fabrication

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Copper indium diselenide (CIS) is one of the most promising semiconducting thin film materials used in the solar cell industry. A typical CIS based solar cell comprises a Mo/CuInSe$_2$/CdS/i-ZnO/ZnO heterojunction. This work describes the novel use of pulsed d.c magnetron sputtering (PDMS) to produce CIS and molybdenum thin film layers from powdered targets. This is a widely accepted method for the deposition of dielectric materials and for reactive sputtering but has not generally been applied to solar cell fabrication. The physical, structural and electrical properties of these films were analysed using SEM, AFM, EDX, XRD, four point probe and hot probe methods. CuInSe$_2$ films form the absorbing layer of the cell. Growth of stoichiometric p-type CuInSe$_2$ with the desired properties has always been a challenge and requires multi-step processes. This technique offers a single step process for depositing CIS films. Films were deposited at room temperature from polycrystalline powders with various starting compositional ratios. The deposited films were found to be nearly stoichiometric for a wide range of powder compositions. They were p-type and pin hole free. Molybdenum layers, used as the back contact, were found to have low resistivity, were also pinhole free and adhered well to the glass substrate. The morphological features are important for back contact layers and we have optimised the process to produce nano-structured fibrous grains. These have a proven potential in high efficiency cells by increasing nucleation sites for subsequent CuInSe$_2$ deposition. The usage of the same deposition technique for both layers can deposit two layers without breaking the vacuum which is important for in-line production on a commercial basis. Powder targets can cut down the cost and materials wastage associated with sputtering from a solid target.

Electron Transfer in Ferritin Probed by Muon Spin Relaxation

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Ferritin is the normal iron storage protein found in all living things: from bacteria to plants to animals. The ferritin molecule is composed of an iron-based, ferrihydrite-like core of up to 4500 Fe(III) ions inside a spherical shell of internal diameter 8nm. This shell, which is approximately 2nm thick, is composed of 24 ploypeptide chains which span the edges of a rhombic dodecahedron as antiparallel pairs. Ferritin is therefore a nearly spherical molecule of the order of 12nm in diameter.

For many years the structural and magnetic properties of ferritin have been the subject of much investigation. However it is the conducting properties of the protein shell that are under scrutiny in this work. Recent measurements have shown that the shell may act as an electron conductor, and as a consequence the possibility that ferritin could be used as a bio-nano-battery is now a topical subject.

The labelled electron method using positive muons allows electron transfer processes in macromolecules, such as proteins, to be probed on a microscopic level. We have used this method, via muon spin relaxation, to investigate electron transfer processes in ferritin. Data collected at finite fields is well described using the Risch-Kehr model at all fields and temperatures enabling the inter- and intra-chain diffusion rates to be determined.

The results will be compared to similar measurements on other proteins.

Au$_4$V – Moment Stability and Spin Fluctuations in the Ordered Phase

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Once annealed below the order-disorder structural transition, found at 560°C, the intermetallic compound Au$_4$V assumes the D1a (I 4/m) structure in the ordered phase. This results in the isolation of the vanadium atoms and the site having only gold nearest neighbour atoms. A surprising consequence, since neither gold nor vanadium generally possess a magnetic moment, is that ferromagnetism ensues with a Curie temperature of 45K[1]. Magnetic susceptibility[2, 3], specific heat[4], Mössbauer resonance[5, 6], and neutron diffraction[7] have all been employed to investigate the origins of this magnetic behaviour which was initially assumed to arise from itinerant electrons, and was assigned to the class of so-called weak itinerant ferromagnet. Indeed the ordered moment is far larger than the paramagnetic moment, which is characteristic of this class of material. Furthermore, the site disordered face centred cubic phase of the alloy is lacking of any magnetic moment, and subsequent investigations concerning the atomic environment revealed a moment can only be supported if the nearest neighbour shell is completely gold, and the next nearest neighbour is vanadium. These results further support the itinerant view, however, several measurements contradict it in that the application of external pressure increases the Curie temperature[8], which is opposite to the behaviour of other weak itinerant systems such as ZrZn$_2$. The vanadium moment also is saturated to a value of 1μ_B by a field of 29T, which is entirely consistent with a localised spin ½ moment. To address this problem and hopefully gain more understanding of the origins of this magnetism Muon Spin Relaxation has been employed to provide a method by which the nature of spin fluctuations in both itinerant and local moment systems can be discriminated between[9]. Using the MuSR spectrometer at the ISIS facility UK, we have been able to observe the evolution of spin fluctuations from 5-90K in both zero and longitudinal fields.

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Arbitrary-Angle Scattering of Spatial Solitons from Dielectric Optical Interfaces

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Abstract removed for reasons of copyright

The Role of Boundary Conditions in Kaleidoscope Laser Modes

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Density Functional Studies of Molecular and Atomic Hydrogen Interaction with MOFs

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H_2 adsorption in MOF-5 has been studied by density functional theory (DFT) simulation with the addition of a semi-empirical dispersion correction (DFT-D) to deal with the dispersive forces, yielding effective binding energies between 37 and 83 meV / H2 (3.5-8.0 kJ/mol) in good agreement with MP2 level calculations. The rotational potential for a hydrogen molecule in each binding site has been evaluated through mapping the adiabatic surfaces. Transition energies of the hindered rotational states have been calculated between 10 and 25 meV for ortho to para hydrogen rotational transitions. The model is verified by comparing with neutron scattering spectra. The inclusion of the dispersion correction with DFT-D is shown to improve upon DFT methods. In addition a thermodynamic study of atomic hydrogen absorption on MOFs is presented predicting the release temperature of hydrogen on a variety of MOFs through the evaluation of free energies within the quasi-harmonic approximation.

Cavity-Enhanced Broadband Light Generation

C S Rose, G S McDonald and J M Christian

Materials & Physics Research Centre, University of Salford, UK

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Structural Characterisation of CoFeB Metallic Glasses

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Magnetic tunnel junctions (MTJs) based on a highly textured MgO barrier layer are capable of reaching exceptionally high magnetoresistance ratios. When coupled with an epitaxial $Co_xFe_{80-x}B_{20}$ ferromagnetic layer the magnetoresistance ratio is able to reach values beyond 355% at room temperature[1-2]. The realisation of such ratios has a profound impact on the spintronic industry and could potentially revolutionise the development of magnetoresistive devices, such as, magnetic random access memory, magnetic read heads and magnetic sensors[3]. The most cost effective way to fabricate such MTJs is to adopt a two stage process; initially MgO is sputtered between amorphous CoFeB layers, if the thickness of the MgO layer is beyond 5 monotomic layers it will possess high texture along the (001); the entire multilayer is then annealed in order to induce crystallisation of the CoFeB layers. The high texture in the MgO layer induces epitaxial lattice matching in the CoFeB layers.

In this study we have used synchrotron x-ray diffraction to follow the time and temperature dependence of the crystallisation of bulk amorphous $Co_xFe_{80-x}B_{20}$ alloys, for two alloy compositions i.e. x = 40, 60. In $Co_{40}Fe_{40}B_{20}$ time resolved synchrotron x-ray diffraction shows that a α-(Co,Fe) solid solution is formed in isolation irrespective of temperature treatment. In contrast, temperature resolved synchrotron x-ray diffraction indicates a two-stage crystallisation process; primary α-(Co,Fe) phase formation is followed by polymorphic crystallisation of $(Co,Fe)_2B$. The Johnson-Mehl-Avrami-Kolmogorov (JMAK) model for isothermal phase transformation kinetics indicates one-dimensional growth with a decreasing nucleation rate for the isolated α-(Co,Fe) solid solution. In a direct comparison, $Co_{60}Fe_{20}B_{20}$, is shown to undergo multi-phase crystallisation during both isothermal and continuously heated temperature profiles. The JMAK model is in agreement to those for $Co_{40}Fe_{40}B_{20}$, i.e. one dimensional growth with a decreasing nucleation rate.

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Building Interactivity, is it Appealing?

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We introduce the use of an online virtual environment as a means of examining if people are more likely to return to and stay longer in interactive architecture. Would a building be more appealing if it had interactive elements? Would that encourage people to visit it again, spend more time in it and promote it to others? Or would interactivity be a trivial presence in a building? Our previous study showed that people could concentrate better when surrounded by moving patterns that give an impression of moving walls. Whether people are more likely to return to architecture that is interactive and the appeal of interactive architecture over a non interactive counterpart has not been tested before. This study makes use of second life as a place where people can visit at will. Two identical buildings were designed for the experiment with one of them having interactive elements. They were then placed in an online virtual environment that is accessible by the public and whose visits were monitored for four months. Initial results indicate that people prefer the interactive building over the non-interactive one. Appeal was measured by number of visitors, number of visits, time spent in each visit, number of groups that visited and returned to each building. These results demonstrate the importance of interactive elements in generating more interest and traffic for buildings and events.

Media Touch Surface for the BBC

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Keywords: Microsoft Surface, BBC, multitouch, interaction

The BBC produce several news broadcasts which involve the presenters apparently interacting with media such as static pictures, video and other data whilst a discussion develops. In reality most of the interaction is rehearsed, staged and controlled by the editors and directors whilst the broadcast is happening. This is acceptable from a viewer's perspective but does not allow the presenters very much scope for dynamic interaction with news media. The BBC have launched a series of social media feeds using Flickr, Twitter and facebook which allow viewers to submit stories, comments and images relating to topical issues and they find that these comments can be posted as a show is being aired. Thus their current model for presenter interaction cannot take advantage of the dynamic and real-time nature of social media. They sought help from the authors to create an interactive table top which would give presenters the ability to directly manipulate this real-time information in a live broadcast studio setting whilst at the same time allow the editors and directors ultimate editorial control of content off camera.

The authors developed a series of prototype touch screen applications which culminated in a bespoke MicroSoft Surface™ multi touch application which allows presenters to select from a list of social media posts which have been pre-approved on a control terminal by the show editors. The presenters can manipulate the chosen media using multi touch gestures such as stretch, rotate and move and the touch surface screen output is mirrored on the studios large display screens which viewers see.

We have carried out trials in the BBC's North West Tonight studio in Manchester where presenter Gordon Burns and Assistant Editor Phil Smith were keen to test the new concept to see how they could work with it in a live show. As far as the authors are aware this kind of touch based interaction with social media in a TV broadcast has not been attempted before and it is hoped that the BBC will use the touch surface in a live news show over summer.

Evolving Emergency Planning Tabletop Exercises

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Emergency medical personnel are taught how to manage Major Incidents on the internationally renowned Major Incident Medical Management and Support, MIMMS, course. One of the course's core elements is a tabletop exercise, upon which a major incident plays out, using a paper mat picturing the scene and plastic counters represent arriving emergency resources.

Problems associated with the use of the traditional tabletop setup include the following: students' work is not recorded; the evolving incident is not tailored to the participants' own working environment and the physical model can become cluttered as the exercise progresses.

Working in partnership with the course facilitators, we have developed an alternative, digital interface designed to address the above issues and thereby enhance tabletop exercise delivery. The preliminary interactive software produced will be trialled by First Aiders, Nursing, Paramedical and Medical personnel on a MIMMS course to be held at Manchester United Football Club in 2011. Crowd medical teams from other football stadia will also be present on the course.

During the tabletop sessions the electronic version will be run in parallel with the paper-based setup and controlled data collated from both user groups. Information will be collected retrospectively via questionnaires exploring student and instructor user satisfaction; usefulness and usability of the interface appraised. Additionally error generation by those using the software will be catalogued via an observational protocol. All data produced will be subject to appropriate statistical analyses.

This presentation will recap the methodology outlined above, demonstrate the electronic interface developed and summarise the usability data generated by its use on this course.

In conclusion, while this is very much a work still in progress, we are taking important, measured, first steps to develop a new, bespoke approach to delivering curricular content via the application of learning technologies to 'real world' Major Incident training exercises.

School of Environment & Life Sciences

Intracellular Uptake of E-combretastatins by Fluorescence Lifetime Imaging

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KEY WORDS: Fluorescence, lifetime, imaging, combretastatin, photo-activation, living cell

Combretastatins have been recognised as potential anticancer drugs, interacting with tubulin, preventing microtubule assembly and inhibiting angiogenesis in developing tumours [1]. The most widely studied molecule, combretastatin A4 (CA4), is based on natural products isolated from the African bush willow. Combretastatins are substituted stilbenes and exist as *E(trans)-* and *Z(cis)-* isomers and the *Z*-forms are generally more active by at least two orders of magnitude [2]. *E*-combretastatin may therefore be considered a pro-drug capable of *in-vivo* photo-isomerization to the more active Z-isomer [3]. On this basis we have studied the uptake of *E*-CA4 and of a fluorinated analogue (CA4F) into live CHO and HeLa cells using two-photon excited fluorescence lifetime imaging. Whilst the *Z*-isomers of CA4 and CA4F are virtually non-fluorescent, the *E*-isomers fluoresce with quantum yields of ~0.1 - 0.2 depending on solvent and with excitation maxima at ~325 nm. Cellular autofluorescence may be minimized with two-photon excitation at 620-630 nm [4]. Images obtained in this way (Figure 1) demonstrate that the *E*-combretastatin is accumulated to concentrations up to ~100-times that in the surrounding medium. Labelling the cells with Nile Red to identify lipid droplets shows that the majority of the combretastatin is located within these droplets. The cellular fluorescence lifetime of ~1.1 ns compares with solution values that range from 0.44 ns in methanol to 1.1 ns in glycerol and is consistent with the cellular location of the combretastatin within a viscous environment. The results indicate that *E*-combretastatins are rapidly accumulated within cells where they might be isomerized to active drug by a two-photon process.
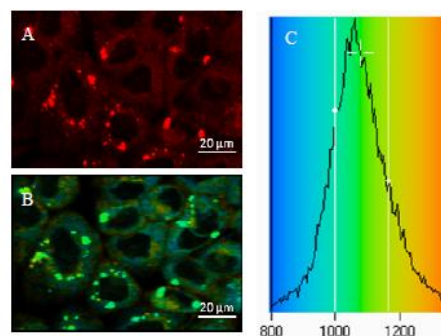
Figure 1: Confocal image of CHO cells incubated with *E*-CA4F. A:- Nile Red confocal fluorescence image (λ_{ex} 488 nm,); B:-FLIM image of *E*-CA4F fluorescence (two-photon excitation 628 nm, fluorescence 400 nm); C:- *E*-CA4F fluorescence lifetime distribution (ps).

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The Use of *ex vivo* Intestine from Abcg2-/- Mice to Investigate the Impact of BCRP on Absorption

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Ex vivo intestine from mdr1a-/- mice has been used successfully to investigate the mechanistic role of P-glycoprotein in absorption from the intestinal tract (Stephens *et al*, 2002, Collett *et al* 2004). However, while BCRP knock-out (KO) animals exist, there has been little investigation of this strain into their suitability for use on the Ussing chamber.

Determination of Abcg2 knock-out was carried out using real-time PCR. The results clearly indicated that the levels of BCRP in the KO animals have been decreased dramatically with no compensatory up-regulation of other transporters noted.

The characteristics of the C57BL/6 wild type and Abcg2-/- animals which may have impacted their suitability for use with the Ussing chamber were also observed. No significant differences between parameters such as electrical stability or passive paracellular transport were noted. However, the average body weight of the Abcg2-/- animals was significantly lower than that of the C57BL/6 animals ($p < 0.05$).

Intestinal tissue samples were mounted on the Ussing chamber and bathed in a buffered Krebs' Ringer and bubbled with a mixture of CO_2 and O_2. The BCRP specific substrate Estrone-3-sulfate (E3S) was selected to measure the apparent permeability (P_{app}) in both the jejunum and the ileum of the mouse. Asymmetric permeability of E3S is seen in both regions of the wild-type intestine, but this asymmetry is not present in the knock out animals; indicating that BCRP mediated transport has been eliminated in the knock out animals. It was also noted that despite the lower levels of BCRP expression observed in the jejunum of the wild type animals, the efflux ratios (ER) for both the jejunum and the ileum were very similar (3.3 and 3.2 respectively). Asymmetric transport of E3S was demonstrated in the ileum of mdr1a-/- mice which would indicate that E3S is not a substrate for PGP.

These preliminary studies show that Abcg2-/- are a potentially useful model for investigating the function of BCRP in intestinal drug absorption.

Investigating the Biological Role of Human NEIL3

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To combat the detrimental effects of DNA damage, cells have evolved a number of DNA repair systems. Chemically altered bases in DNA are removed by a number of DNA glycosylases in the first step of base excision repair. Among these, mammalian cells contain three proteins, NEIL1, NEIL2 and NEIL3, with homology to the *Escherichia coli* Fpg and Nei proteins. However, while the function of NEIL1 and NEIL2 as DNA glycosylases/AP lyases is well documented, no substantial DNA glycosylase activity on double-stranded DNA substrates has been detected for NEIL3. NEIL3 is the largest member of the family with an extended C-terminal domain and is unique to higher eukaryotes, showing a restricted gene expression pattern, mainly in cells of the immune system. To investigate the biological role of human NEIL3 (hNEIL3) a yeast two-hybrid assay (y2-h), a system that allows the examination of protein-protein interactions will be carried out. In y-2h, the chosen 'bait' protein (hNEIL3) is expressed in yeast fused to the DNA-binding domain of a bipartite transcription factor (LexA), while the second protein (the prey) is expressed from a cDNA library, bound to the activation domain (B42) which, in combination with LexA activates transcription. Neither LexA nor B42 alone are able to activate the transcription; only if they are in close proximity due to interaction of the bait protein with a prey protein, will transcription of a downstream reporter gene occur. In this project the LexA-operator is responsible for the expression of two genes; LEU2, which is involved in leucine biosynthesis and LacZ. The use of two reporter systems allows a double selection, which decreases the number of false positives. Results from initial experiments needed for validation of the y2-h system with hNEIL3 will be presented.

How Meerkats Perform Category Discrimination of Predator–Non-Predator Stimuli

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The ways in which animals form categories and solve discrimination problems have long been subjects of interest. Here, I attempted to confirm 1) whether meerkats could detect a predator via a stimulus that signalled presence, but was not the actual predator; and, if so, 2) on the basis of what feature(s) were they able to make that discrimination? Early detection of predator presence (i.e. before visual contact is made) is likely to facilitate avoidance and will be favoured by selection, but if this is achieved through matching a stimulus to a predator–potentially forming mental representations of that 'not-then-present' predator in the mind–this constitutes a cognitively challenging feat. I conducted trials on a large group of predator-naïve captive meerkats at Knowsley Safari Park, Merseyside. In the first series of trials, meerkats were presented with fresh faeces of potential predators (e.g. dog, serval) and non-predators (e.g. giraffe) to record interaction times according to stimulus type. Meerkats interacted significantly longer with the 'predator' faeces. In the second series of trials I used one of the successful predator species (dog) and presented faecal samples to the group that differed by diet (meat versus vegan-fed). Meerkats spent significantly longer inspecting the faeces of meat-fed dogs. Taken together, these results suggest that predator-naive meerkats are able to infer the presence of a non-present predator on the basis of a cue alone, and that detection may be being achieved as a consequence of predators' meat-eating activities.

Coalition Behaviour of Related and Unrelated Captive Male Cheetahs (*Acinonyx jubatus soemmeringii*)

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The cheetah is known to reproduce poorly in captivity and research suggests that the reasons for this are behavioural, rather than physiological. Appropriate social housing is important in enhancing reproductive success in captivity and this study examined the effect of changes in social housing on the behaviour of four male cheetahs: two siblings and two half siblings. In the wild, male cheetahs remain in stable groups, or coalitions, throughout their lifetime. Coalitions usually consist of littermates but non-related males may also join up with littermates to form coalitions of two or three individuals. During the study, the cheetahs were housed both in pairs and as a group of four, before one male was relocated. The remaining cheetahs were then housed in a trio. Indices of association were calculated for each cheetah pair, which showed that two coalitions existed before the relocated male departed, as there was a close association within the sibling pair and within the half sibling pair, but not between pairs. Following the relocation of one of the cheetahs, the remaining males appeared to form a coalition of three, as the indices of association between the non-related male and the siblings increased. Affiliative behaviours were frequently shown within pairs and little overt aggression was observed. The findings of this study indicate that the natural social groupings of male cheetahs can be replicated in captivity, which could potentially improve the chances of reproductive success when they are introduced to female cheetahs.

Key words: felid; sociality; behaviour; captive breeding, zoo

Keeper Ratings of Animal Personality as a Tool for Improving the Breeding, Management and Welfare of Zoo Animals

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The effect of individual differences on the behaviour and reproduction of zoo animals has long been recognised by zoo biologists, and people who work with animals often describe their different personalities. Yet it is only recently that the quantitative assessment of personality has been used to investigate some of the challenges faced in zoo animal breeding, management and welfare. Zoo animal personality is most commonly assessed through the use of observer ratings, where people who are familiar with the animals (zoo keepers, for example) are asked to rate them on various personality traits. Evidence from the growing body of research into zoo animal personality demonstrates that zoo keepers are able to reliably rate animal personality traits based on their knowledge and long term observations of the animals in their care. These ratings have validity as they are shown to independently correspond to measures of behaviour, reproductive success and biological factors, such as reproductive cyclicity in females and adrenal activity. Knowledge of personality can help to assess the reproductive failure of individuals, predict which animals will be compatible for breeding and provide an indication of how an animal will react to novel events such as transfers between collections and introduction into new social groups. Thus, a validated personality questionnaire is a valuable tool for zoo professionals. Keeper ratings of animal personality can be implemented into existing management practices and used to inform decisions on captive breeding, social group cohesion, welfare and conservation.

Key words: Animal behaviour, animal personality, captive breeding, conservation, zoo

Pseudodactylogyrus spp. in Wild Eel Populations of the United Kingdom

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The European eel, *Anguilla anguilla,* is an economically important species that contributes to biodiversity within UK and European inland and coastal waters. The numbers of *A. anguilla* have suffered major decline in recent years and the species is now viewed as threatened. One contributory factor to this decline is believed to be the pathological impact of infectious agents such as parasites and viruses. To assist understanding of the role(s) of parasites in eel population decline, we have been conducting epidemiological studies that focus upon eel helminths of the United Kingdom. The gill monogenean helminth *Pseudodactylogyrus* spp. is responsible for the development of gill filament lesions, hyperplasia and haemorrhaging; collectively termed pseudodactylogyrosis, which is considered to be a major problem to the eel farming industry. However, there is limited information on the extent of *Pseudodactylogyrus* spp. in wild populations of eel in the UK. To this end, we are in the process of examining > 500 eels from twenty-seven river systems across England and Wales for the presence of pseudodactylids. Our initial data confirm that *Pseudodactylogyrus* spp. is present in eels captured from river systems in South Wales and Cumbria, with prevalence ranging from 20% to 70%, whereas specimens examined from river systems in the South of England appear to be non-infected. We are in the process of speciating these monogeneans with a view to better understanding their distribution amongst UK eel populations and facilitating improvements to the management of European eel stocks in the United Kingdom.

A First Report of Notocotylus sp. in the British Bank Vole Myodes glareolus at Malham Tarn, North Yorkshire

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Species of the genus *Notocotylus* Diesing 1839 primarily infect waterfowl. The genus is cosmopolitan however to date only a limited number of species that exclusively parasitize rodents have been reported. To our knowledge, infection in the UK has been predominantly found in waterfowl however we recently recorded an occurrence of *Notocotylus* sp. in the bank vole *Myodes glareolus* at Malham Tarn, North Yorkshire. Members of the genus *Notocotylus* are characterised by several key taxonomic features. Simon-Vicente *et al.,* (1985) demonstrated the existence of four stable intraspecific features that are of differential systematic value: (1) cirrus sac and cirrus, (2) metraterm, (3) uterine coils at the cirrus sac level, and (4) metratermic glands. The morphology of our 565 specimens however fails to conform to the description of any species previously described from rodents using these criteria and as such the specimens acquired from Malham Tarn currently remain a species inquirenda. The ecology of this species at Malham Tarn is furthermore unknown. In an attempt to elucidate this we have sequenced the entire Internal Transcriber Space (ITS) of the ribosomal DNA gene and optimised a PCR test using primers designed specifically for this region. The assay is currently being be used to identify snail intermediate host species involved in maintaining transmission within the area. This is a first report of ITS sequence data from a *Notocotylus* species and therefore cannot be used for identification purposes. The ITS sequence however will however provide a definitive tool for identification of larval stage parasites isolated from snails.

Investigation of Vertical Transmission of the Parasite *Toxoplasma gondii* in Humans in Libya

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Toxoplasma gondii is single celled parasite that infects all warm blooded animals including humans. One in three humans, on average, are infected with this parasite. It is an important disease causing agent that is responsible for abortion in humans and farm animals. It can be transmitted in three ways: via cat faeces, eating raw meat and vertical transmission (mother to baby). As it is not known which of these is most important, the objectives of this study were to measure vertical transmission in humans. To achieve this 150 umbilical cord samples were collected from volunteer subjects in Misurata Central Hospital and Alsaied Hospital in Misurata in Libya for subsequent DNA extraction and testing. It was found that vertical transmission occurred in 2% of births. This is much higher than previously published results which suggest that it occurs at a rate of less than 1 in 1000 live births. The clinical records from these subjects were analysed and there was no evidence that these transmission events were associated with miscarriage. In conclusion, these data suggest that vertical transmission may be much more important than previously thought. Furthermore, the fact that infection of the newborn does not affect pregnancy success suggests that this might be an important route of transmission for this parasite.

Use of MGE-PCR as a Tool to Investigate the Origins of the Soroti Sleeping Sickness Epidemic in Southeast Uganda

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Sleeping sickness is a fatal disease caused by a blood parasite, Trypanosoma brucei, and is transmitted throughout Africa by the tsetse fly. There are some 50,000 new cases per year which are fatal if untreated. The toxicity of the available drugs results in the deaths of 10% of patients treated. In Africa, human sleeping sickness occurs in distinct geographical foci which are characterized by disease epidemics interspersed with periods of endemicity (low level disease). An understanding of the mechanisms of maintenance of these foci and the generation of epidemics may give insights into how the disease may be controlled. In Uganda, sleeping sickness has traditionally been associated with a large established focus in the south east of the country in Busoga with recent epidemics in Tororo (1988-1992) and Soroti (1998 to date). These epidemics are now spreading North West in Uganda at an alarming rate. In Salford, we have developed a technique known as MGE-PCR which can be used as a "DNA fingerprinting" tool for tracking the movement of trypanosome strains between hosts during epidemics. In previous work we have shown that the movement of cattle around Uganda has been responsible for the generation of sleeping sickness epidemics. In particular, it has been thought that the recent epidemic in Soroti was caused by cattle movements from the region of the earlier epidemic in Tororo. In this work, we have applied MGE-PCR to investigate the origins of the recent epidemic in Soroti. We show that the epidemic there was indeed caused by introduced cattle carrying the human parasites but that there were a number of different sources of disease carrying animals. This shows that it is important to understand the infection status of cattle and the movement of cattle to prevent or limit future epidemics of sleeping sickness.

Evidence for High Levels of Vertical Transmission in *Toxoplasma gondii*

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Toxoplasma gondii is a highly ubiquitous and prevalent parasite. Despite the cat being the only definitive host, it is found in almost all geographical areas and warm blooded animals. Three routes of transmission are recognised: ingestion of oocysts shed by the cat, carnivory and congenital transmission. In natural populations, it is difficult to establish the relative importance of these routes. This poster reviews recent work in our laboratory which suggests that congenital transmission may be much more important than previously thought. Using PCR detection of the parasite, studies in sheep show that congenital transmission may occur in as many as 66% of pregnancies. Furthermore, in families of sheep on the same farm, exposed to the same sources of oocysts, significant divergent prevalences of *Toxoplasma* infection and abortion are found between different families. The data suggest that breeding from infected ewes increases the risk of subsequent abortion and infection in lambs. Congenital transmission rates in a natural population of mice were found to be 75%. Interestingly, congenital transmission rates in humans were measured at 19.8%. The results presented in these studies differ from those of other published studies and suggest that vertical transmission may be much more important than previously thought.

Can in vitro Tests Reflect in situ Activity of Antimicrobial Coatings?

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Currently used standard methods for evaluation of antimicrobial materials usually involve incubation of a sample of the material in a suspension of organisms or placing a suspension of the organisms on the material and leaving the suspension in close contact with the surface. Viability of the test organisms is then measured by viable count methods. One disadvantage of these tests is that they do not reflect real life contamination which may occur in a healthcare setting where moisture may be transient or include interfering agents such as protein e.g. a splash of fluids or a hand/fingerprint. We have therefore developed and evaluated test methods for these conditions and show that although the activity is reduced when compared to the standard tests activity against pathogens is maintained. The implications for use of antimicrobial surfaces in the healthcare setting will be discussed.

Antimicrobial Activity of Cu-SiO$_2$ Coatings against Hospital Pathogens

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It is possible to coat a variety of substrates (glass, metal, ceramic) with a thin (<100nm) coating of CuO-SiO$_2$ using chemical vapour deposition. Such coatings are durable and have a high antimicrobial activity (>5log kill within 4 h) when tested with standard test organisms (*Escherichia coli* and *Staphylococcus aureus*). We have evaluated the activity of copper-containing surfaces against some pathogens of current concern including ESBL positive *E. coli,* KPC producing *Klebsiella pneumonia*e, *Pseudomonas aeruginosa*, *Stenotrophomonas maltophilia*, *Acinetobacter baumanii* and several MRSA strains. The results show that such coatings also have a good antimicrobial activity (>5 log reduction after 24 h) against the Gram-negative organisms but the MRSA strains were more resistant. The potential uses of such coatings will be discussed.

Tumour Necrosis Factor-Related Weak Inducer of Apoptosis (TWEAK)-Induced Skeletal Muscle Damage is Attenuated by the Ω-3 Polyunsaturated Fatty Acid (PUFA) Docosohexaenoic Acid (DHA)

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TWEAK is a member of the tumor necrosis factor (TNF) superfamily implicated in several inflammatory pathologies including skeletal muscle wasting. Previously we found that the omega-3 PUFA, eicosapentaenoic acid, inhibits TWEAK-induced atrophy. We hypothesised that DHA, another Ω-3 PUFA, may also have anti-inflammatory activity.

C2C12 myoblasts were differentiated by culture in growth medium containing 2% horse serum and were treated with DHA (50μM) and/or TWEAK (10ng/ml). Myogenesis was evaluated morphologically by a myogenic index, by myotube metrics and by myosin heavy chain expression. Conditioned media (CM) was examined by ELISA for interleukin (IL)-6 expression.

TWEAK significantly ($p < 0.01$) inhibited all morphological markers of differentiation and significantly ($p < 0.05$) increased IL-6 in CM of treated cells, compared to the untreated control. However, DHA blocked the effects of TWEAK and restored morphological markers of differentiation and IL-6 production to control levels.

In summary, DHA treatment protects against TWEAK-associated reductions in skeletal muscle differentiation and increased pro-inflammatory cytokine production. These data suggest anti-inflammatory roles for Ω-3 PUFA, particularly where pathologically high levels of TWEAK may be present and support further work to elucidate their mechanisms of action.

Home and Away: British Women's Narratives of Community in Spain

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'Community' as a concept has enduring theoretical and practical significance. Often discussed in terms of representing something lost yet recoverable, community has further relevance in understanding social change and continuity. Underpinning discourses of community, there is often a recurrent theme of loss and recovery which has utopian and nostalgic overtones and this permeates contemporary understandings of what community represents. Since the 1970s, migration to Spanish coastal resorts – costas - has significantly increased and retired British migrants constitute a large proportion of such movement. For retired migrants living on the Costa Blanca, there are multiple forms of belonging to community and representations of community are multi-dimensional, complex and overlapping in nature. Place continues to be salient, but belonging to places is now more complex as a result of transnationalism through lifestyle migration and increased global movement. Further, constructions of belonging to place are inextricably linked to networks and ethnicity.

Nostalgic constructions of community can be understood as an antidote to modernity and nostalgia denotes the mourning of a lost time as well as a lost home or place. In times of rapid social change, when people's intimacy with the world – represented as belonging to places, networks and ethnic group – is compromised, they seek to recreate it through nostalgia. Nostalgic constructions of belonging are key to how people give meaning to their lives. Different types of belonging are linked to community through a sense of nostalgic intimacy with the world. If intimacy with the world is compromised then nostalgia constructs and reflects belonging. In the absence of real intimacy or closeness, nostalgia is ignited through narrative and fills this gap. Nostalgia therefore, is a form of chronotope since it can be used to link time and space.

Local Innovation in Social-Ecological Systems

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Early approaches to researching social-ecological systems have focussed on rather simplistic interactions between humans and nature such as riparian and agricultural communities, emphasising management in the face of uncertainty. Recently, attention has turned to the more complex social-ecological systems found in cities. This is a response to the ever encroaching effects of urbanisation, a trend that has far-reaching, often harmful consequences for human well-being, biodiversity, sustainability and the future of human-nature interactions. However, cities are also centres of human innovation and creativity which may be motivated by desires to address the environmental challenges caused by cities. This places cities in the curious position of simultaneously being both perpetrator of environmental damage and protector of that same environment. This research project enters into this seeming paradox by investigating the dynamics of ecological innovation and evaluating the outcomes of such innovation in the city.

The Ecosystems approach as defined by the Millennium Ecosystem Assessment attempts to optimise our relationship with nature for the sake of the services which we can thereby derive (coined "ecosystem services"). Ecosystem services are divided into four categories: provisioning services, providing direct concrete goods such as wood or food; regulating services towards flood prevention, climate control, or water quality; cultural services, the less tangible recreational, educational, or spiritual benefits; and supporting services in the form of primary production, nutrient cycling, and soil formation. These services are linked to human health and well-being.

Community gardening and associated local food production programmes, a social-ecological system, might provide a number of ecosystem services. But it is not clear what services are provided or the extent of that provision, now and in the future. The outputs of this study will have relevance in countries across the world as innovative practices develop that seek to address the environmental challenges of the 21st century.

Ponds in Time and Space:
Pattern and Process in an Urbanised Pond Landscape

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Ponds are highly dynamic features in the landscape. Adjacent ponds can demonstrate considerable variation in terms of their physical and biological characteristics. In addition both individual ponds and pond networks can exhibit variation over time. The high biodiversity of ponds and therefore, their importance for conservation, owes much to this variable nature. While ponds in the rural landscape have received considerable research attention those in urban areas have largely been overlooked. While these urban ponds potentially face even greater anthropogenic pressures than in the wider countryside, they can also have more direct, day to day relevance to the lives of an increasingly urbanised population. Data was gathered on the current and historical pond landscapes of the Borough of Halton, northwest England. In addition data on the ecology and surrounding landscape of thirty-seven ponds within the borough was collected as part of a three years in-depth study (2005 – 2007). These data were compared to data from an adjacent rural survey (from the county of Cheshire) and from the nationwide Countryside Survey. The richness of species of aquatic invertebrates and plants found in Halton's ponds was comparable to those from the national dataset but lower than found in Cheshire. Within Halton, data at the borough level showed a general trend in decreasing pond numbers. However, at a more local scale a much more complex picture of changing pond distributions was revealed. The most significant impact on pond species richness was the density of ponds within a 1km radius. This demonstrates the importance of both landscape scale and local approaches to the creation of new ponds and management of existing ones. These data also show the potential value of creating ponds even in highly urbanised areas.

Key Words: Pond loss, Urban, Landscape, Density, Species Richness, northwest England

Sustainable Transit-Oriented Development in Copenhagen, Denmark

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Ørestad is Copenhagen's linear new town being built over a 30 year period around stations on an elevated, driverless mini-metro line. The metro's construction is financed by the sale of publicly-owned land along the route to developers. The Øresund Bridge from Malmö in Sweden also facilitates substantial international commuting to Ørestad. This paper briefly assesses Copenhagen's 60 year record of sustainable transit-oriented development since its 1947 Finger Plan. It focuses principally on analysing Ørestad's progress since the late 1990s in creating public transit-oriented development of jobs, housing and retail, education and leisure facilities. The paper finally examines the extent to which Ørestad is contributing to Copenhagen's economic growth and relieving pressure on Copenhagen's CBD.

Drivers of Change: Using the Ecosystem Service Framework to Select Vegetation Management Options

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Ecosystem services and how these are affected by vegetation management for conservation are being investigated. The ecosystem service framework is integrated into decision making to increase biodiversity, ecology and cultural services. The current study uses a rapid assessment of the effects of grazing or mowing on a suite of ecosystem services attributable to saltmarsh.

Our rapid assessment found grazing to be the preferred option over mowing. Grazing to manage vegetation is a well established method of maintaining or enhancing diversity on saltmarsh. Paucity of data regarding decisions and effects on ecosystem services is recognised. Exclosures are being used to measure changes in vegetation structure and assemblage to validate our findings with regard to ecologically based ecosystem services. The current study is part of a larger effort to maximise ecosystem services delivered by the Upper Mersey estuary, Cheshire, through management of vegetation in the habitats found there.

The Ecosystem Services of Naturalistic Urban Vegetation and its Future

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"Ecosystem services" is increasingly recognised as a concept that can aid sustainability of ecosystems, and there is a drive to include this concept into planning and policy practices. The aim of this research is to identify the ecosystem services of naturalistic urban vegetation and how these services respond to drivers of change. For the purpose of this paper, the authors define naturalistic urban vegetation as 'vegetation in an urban environment that consists of only native species that have been planted and managed by humans'. This paper describes results collected from botanical surveys carried out in Runcorn, UK. Eight ecosystem services associated with naturalistic urban vegetation in Runcorn have been calculated: energy conservation, air quality improvement, carbon dioxide reduction, water runoff, aesthetic properties, spiritual properties, recreation and noise buffering. Four future scenarios for areas of naturalistic urban vegetation have been developed and the associated changes to the eight ecosystem services have been calculated. These scenarios represent a range of possible situations that could occur between 2011 and 2060. The aim of these scenarios is to stimulate thought, discussion and new ideas amongst landowners regarding future management strategies of areas of naturalistic urban vegetation to *circa* 2060.

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Visual Analysis of Image Quality in Lateral Thoraco-Lumbar Anthropomorphic Phantom Images

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PURPOSE: To analyse observer variability in the use of a visual analogue rating scale (VARS) for assessing the quality of lateral thoraco-lumbar image to be used for Cobb and superimposition methods of inter-vertebral angle calculation.

METHODS: A five items VARS was adapted from the European guidelines on quality criteria. VARS was to be used to discriminate quality differences within lateral thoraco-lumbar images. These images were to be used for inter-vertebral movement calculations by Cobb and superimposition methods. Two experienced radiographers selected 50 different anthropomorphic lateral thoraco-lumbar images using a consensuses approach (selecting a balanced mix of good, average and poor images). Then, three different experienced radiographers and a relatively inexperienced observer (orthotist) appraised the images using the adapted VARS. The results were analysed statistically (Kappa).

RESULTS: Kappa revealed that the level of agreement between all observers, including the orthotist, was the same. The agreement ranged from substantial to almost perfect (0.648 to 0.912). There was one exception - moderate agreement between one radiographer and both the inexperienced observer and another radiographer (0.490, 0.454, respectively). Also items that include visualisation of specific bony structure as a single line (i.e. the edges of the vertebrae) had lower agreement level than other VARS items, e.g. visualisation of the inter-vertebral space. This may be because edges are the hardest to appear clearly in an x-ray image.

Conclusion: VARS discriminated between good, average and poor image qualities for all four volunteers. The orthotist performed similarly to the experienced volunteers. VARS may value in the clinical routine.

Optimisation of Lateral Thoraco-Lumbar Acquisition Parameters for Cobb and Superimposition Method for Inter-Vertebral Movement Estimation

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PURPOSE: Optimise dose and image quality to produce lateral thoraco-lumbar images suitable for accurate and reproducible inter-vertebral movement calculations using Cobb and superimposition methods.

METHODS: In this optimisation procedure, all acquisition parameters were thoroughly evaluated in terms of their effect on image quality and dose. Using an anthropomorphic phantom, each parameter was evaluated independently, while other factors were fixed. This resulted in the generation of several thousand images. These were then appraised using a visual analogue rating scale (VARS). Finally, effective dose (ED) of the VARS values which produced images of a suitable quality were calculated from Montecarlo simulation of dose area product (DAP) as well as entrance surface dose (ESD). RESULTS: Compared to diagnostic reference levels (DRL), DAP and ESD were reduced significantly (<80%) from the DRL of lateral lumbar or lateral thoracic exposures without affecting the required image quality for inter-vertebral movement calculation. Factors that effect this reduction include: placing the cathode toward the feet, using broad focal spot size, having precise collimation, not using grid, moderately far SID and low mAs. This will reduce the absorbed dose by patients (ED) to almost 75% less than the typical lateral thoracic and lumbar exposures doses in UK (1).

Conclusion: Using a systematic approach for optimising the lateral thoraco-lumbar image for inter-vertebral movement calculation it is possible to produce a suitable image with significantly reduced ED. This method may be a suitable way for optimising radiological exposures, as it considers the interlinked effect of the range of parameters which effect image quality and dose.

(1): Wall BF, Hart D. Revised radiation doses for typical x-ray examinations. The British Journal of Radiology 70:437-439; 1997. (5,000 patient dose measurements from 375 hospitals).

Practitioner Variability of Breast Compression in Mammography

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Purpose: To determine whether breast compression force varies between and within mammography practitioners.

Method: Ethical approval granted for 500 clients; 488 met the inclusion criteria. Clients were imaged by 14 different practitioners. Collated data included: BI-RADS® density, breast volume, breast thickness, compression force and practitioner code.

Findings: Breast volumes and BI-RADS® densities imaged varied between practitioners. ANOVA found a highly significant difference in the mean compression values used by different practitioners, even for the same BI-RADS® density ($p < 0.0001$ for each BI-RADS® density). However, further analysis demonstrated three practitioner groups who did use similar compression to other members of the group. Six practitioners showed a significant correlation ($p < 0.05$) between compression force and BI-RADS® grade, with a tendency to apply less compression force with increasing BI-RADS® density. When compression was analysed by breast volume there was a wide variation in compression force for a given volume; even for practitioners within the same group. The general trend was the application of a higher breast compression force to larger breast volumes by all three practitioner groups. The slopes of the trend lines for each group were very similar with compression increasing by 1.6 daN per 1000cm^3.

Conclusion: Compression force used by practitioners was analysed by BI-RADS® densities and breast volume; neither showed consistancy amongst all practitioners, though it clearly identified three distinct groups using low, medium and high compression values. A multi-centre analysis, using a larger practitioner group, may prove useful.

Working Well

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The Working Well (WW) project provided an innovative service delivered by a specialist occupational physiotherapist employing a worker-centred, case management model, addressing musculoskeletal disorders (MSDs) to reduce sickness absence, and associated costs whilst improving the health and well-being of staff within Salford Primary Care Trust. The NHS has the highest rate of sickness absence, 11.7 days per employee with an average cost of £1.7 billion; with MSDs being the main cause. WW provided a flexible rapid response; work-focussed bio-psychosocial assessment; physiotherapy treatment; liaison and guidance for line managers; and workplace assessment. A mixed-methods evaluation was conducted using an internal/external model. Outcome measures were obtained pre-intervention, at discharge and at 3 and 6-month follow-up. Interviews and focus groups were held to understand staff and line managers' perceptions of WW. **Quantitative data:** The mean number of MSD sickness absence days post WW was significantly decreased. The General Health Questionnaire, measuring psychological well-being; and the Person Specific Function Scale, measuring patient perceived function, indicated significant improvements across three points in time (Pre-WW, discharge, 3-month post). A significant difference was noted between pre-WW and discharge, with no significant difference between discharge and 3-months post. The Job Satisfaction Scale showed no significant difference in scores across three points in time. However, there is a significant increase in the score between pre-intervention and discharge in the predicted direction. And no significant difference between discharge and 3-months post discharge. **Qualitative data:** High levels of satisfaction were reported. The perception was that WW aided staff to return-to-work/stay-at-work. The results indicate significant improvements in sickness absence levels, staff psychological well-being; work satisfaction; and identified functional limitations; this was maintained at 3-months post discharge.

A Preliminary Study of Learning to Use a Trans-Radial Upper Limb Myoelectric Prosthesis

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It is established that gaze and kinematic behaviours change during learning to perform a novel upper limb task. Such behavioural changes during learning to use a myoelectric prosthesis have not been explored. We studied the gaze and kinematic behaviours in 5 anatomically intact participants while performing a manual task (pouring water from a carton into a cup) first with their anatomical arm and then with a trans-radial myoectrically-controlled prosthesis. Additionally, we investigated the effects of training on gaze and kinematic behaviours associated with prosthesis use.

The participants, when first using their prosthesis, showed gaze behaviours which were distinctively different from those observed when performing the task with their anatomical hand. For example, during reaching for the carton using their anatomic hand, participants rarely (< 5% of the total time) looked at the area of the carton to be grasped (termed the Grasp Critical Area, or GCA); conversely, when reaching with the prosthetic hand, participants focused on the GCA over 60% of the reaching time. Over the course of 2-week training, during which they became more proficient at prosthetic use, characteristic changes in gaze behaviour were observed.

We also found clear differences both in arm joint kinematics and the temporal variability of the prosthetic forearm-measured acceleration trajectories before and after prosthetic training. These results will be used to inform an ongoing follow-on study of upper limb myoelectric prosthesis users.

ROCView – A Web-Based Prototype for Easier Data Collection in JAFROC Analysis

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The value of an imaging modality can be judged by a combination of physical and human perception measures. Jack-knife free-response receiver operating characteristic (JAFROC) methods have developed as a suitable model for evaluating perceptual measures. JAFROC methods are an advancement to traditional ROC analysis; JAFROC requires the reader to provide the precise localization of a lesion and to give a confidence (rating) scale response. This is known as a 'mark-rating' pair. A recent study of CT dose optimization and lesion localization prompted the creation of ROCView. ROCView is a web-based software prototype which facilitates accurate data recording in JAFROC studies. It allows multiple readers to view, localize and score confidence in the presence of suspected lesions across multiple modalities and cases. It also allows multiple localization opportunities per case. The focus is on making the reader accurately locate pathology and compare them to the true status of each case. To comply with guidance, reader responses are classified as a lesion localisation/true positive or non-lesion localisation/false positive via an acceptance radius that is built into ROCView. The reader does this by making mouse clicks on each case to indicate position and score confidence in their decision.

Reader responses are recorded into two reports as required for JAFROC analysis: true positive and false positive. Only minor manipulation of data is required before it can be analyzed with currently available JAFROC and Dorfman Berbaum Metz Multi Reader Multi Case (DBM-MRMC) software.

Supplementary Imaging of the Spine Following Bone Scintigraphy: A Phantom Based Study Comparing Absorbed Dose of the Male and Female Reproductive Organs from Radiography and Computed Tomography Imaging

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Key words: Supplementary Imaging, Radiation Dose, Nuclear Medicine.

Bone scintigraphy has long been the first stop for patients undergoing investigation of bone metastases. The procedure is recognised as highly sensitive to the disease however this corresponds to a low specificity. As a result supplementary imaging to characterise and localise lesions is often required to aid diagnosis. There is a range of modalities that can be utilised for this purpose including computed radiography (CR) digital radiography (DR), multidetector computed tomography (MCDT) or CT acquisition using hybrid SPECT-CT systems.

The aim of the project was to compare the absorbed dose by the male and female reproductive organs when imaging the lumbar spine using local protocols in CR, DR, CT component of a SPECT-CT scanner and MDCT.
An ATOM 701-D dosimetry phantom and calibrated thermoluminescent dosimeters (TLD) were subjected to radiographic examinations of the lumbar spine. The TLDs were positioned within the phantom to measure the absorbed dose of the ovaries and testes. Using three repeated measures, antero-posterior and left lateral lumbar spine radiographs were acquired using diagnostic reference levels on CR and DR technology. CT Imaging of the lumbar spine was carried out using a GE Infinia Hawkeye gamma camera and a GE Lightspeed 64 CT scanner.

Results showed the absorbed dose to the ovaries were DR 6.6mGy; CR 4.4mGy; MDCT 7.1mGy; hybrid CT 3.6mGy ($p < 0.05$). The absorbed dose to the testes was found to be: DR 8.1mGy; CR 4.9mGy; MDCT 4.0mGy; hybrid CT 1.7mGy ($p > 0.05$). Comparison of results using ANOVA found that the organ dose from the different modalities were significantly different for females, but not for males. Numerical comparison of the results demonstrates that the hybrid CT acquisition resulted in a lower absorbed dose compared to the other modalities for both males and females.

Adapted from an abstract accepted by the European Association of Nuclear Medicine Conference 2011.

Salford Housing &

Urban Studies Unit

The SALFORD House: The Impacts and Contemporary Implications of a 1970s Low-Energy House

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In the 1970s cold, condensation, mould, the subsequent deterioration of property and the health and well-being of occupants were problems common to many houses in the UK. Salford City Council, presented with this problem in the mid-1970s, approached the University of Salford to design together economic low-energy housing that was suitable for low-income tenants in an urban environment.

The underlying principles of the resulting design are highly insulated, well-sealed, dwellings with a high thermal capacity. The SALFORD design concept that evolved embodies the following elements:

- A highly insulated envelope, nominally 200 mm all round, to reduce substantially heat losses (and unwanted gains) through the fabric.
- A large thermal storage capacity within the insulated envelope, to reduce temperature variations, to make full use of incidental gains and to permit a wide flexibility of heat sources and heating strategies.
- A well-sealed envelope to permit control of ventilation rates, suitably low in winter to conserve energy and high in summer for cooling as required.

In 1978 two experimental, semi-detached, dwellings were built, followed in 1980 by a further six dwellings in a terrace design. The dwellings were extensively monitored through 1980-82. Subsequently the local authority built a further 200 or so across the City.

This poster reports on research that has re-visited these properties 30 years on. From extensive consultations with current and ex-residents of these properties, as well as various stakeholders, this poster will report on:

- The long-term energy savings of the design
- Long-term maintenance and modifications to the original dwellings
- Occupant opinions
- The relationship between energy use and occupant behaviour

Mobility and Person-Place Relationships:
A Case Study of 'Stokies' and the City of Stoke-on-Trent

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Stoke-on-Trent is a city that grew in size and importance throughout Britain's industrial revolution but has since failed to thrive in the post-industrial era. Successive governments in the post-war years have alternated in their approaches to addressing the social and economic problems associated with post-industrial cities and the inequality of growth commonly referred to as 'the north/south divide'. Policy has attempted to answer questions about the mobility of the workforce: the Conservatives encouraged workers to descend upon the growth areas in the south; New Labour achieved moderate success in reversing this trend by promoting competition among regions to attract their workers.

During the late twentieth century, psychologists began to take an interest in the relationship that citizens have with the places they inhabit. 'Grieving for a lost home' was first identified among residents subjected to forced relocation in Boston, MA (Fried 1963). Since that time, 'place attachment' has been used to describe the affective, cognitive, and behavioural bond between people and places, and literature in the area is firmly focused on traditional psychological epistemologies that attempt to explain how place bonds exist as a phenomenon; however, these approaches assume there are 'truths' about attachments that are awaiting discovery.

This PhD research views places and place attachments as socially constructed artefacts formed through the language and discourse that we have for them. This approach enables a critique of political ideologies and the role of traditional psychology within them. The research will examine the discourse of attachments to Stoke, within the context of mobility choices, and provide a richer understanding of the relationship between people and the places they live.

Exploring Migrant Workers Perceived Contributions to the UK

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In recent years there has been an increasing focus on migration of people to the UK, particularly from Central and Eastern Europe. Political and media debate has focused on the number of people who have arrived in the UK, the impact this has had on indigenous workers, as well as the impact on public services.

There has also been an interest in the contribution of migrant workers. Government Select Committee Reports and other policy think tanks, such as the Institute for Public Policy Research (IPPR) have highlighted contributions to the UK economy. In overall terms, existing literature reveals an emphasis on measuring the contribution of Central and Eastern European Migrants in economic terms, but also from a third person perspective (i.e. what large public bodies see as worth measuring and publishing). There has been lack of research on how these broader evaluations correlate or contrast with the views of migrants themselves.

This poster reports on research commissioned by Migrant Workers North West focusing on migrants' perceptions of both their current and future contributions. The research involved 20 in-depth interviews with Central and Eastern European migrants living and working in Liverpool. In addition to carrying out interviews, the project also worked in collaboration with a professional photographer who captured images that were of meaning to the participants. The research and photographic project highlights both financial and labour market contributions; however, it also illustrates the need to look beyond economic contributions and focus on those contributions that are not as easy to measure such as contributions to community life.

Preventing Violent Extremism (PVE): An Evaluation of the Manchester City Council Prevent Programme

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The UK is no stranger to terrorist attacks. Through the 1970's, 80's and 90's the UK had to endure the constant threat from the IRA in major cities across the UK. The events of 9/11 elevated the threat of terrorism to a global problem.   However on the 7th July 2005, this threat was realised in domestic terms when the bombings in London were carried out by British Muslims. In response, in 2007 the Preventing Violent Extremism (PVE) Pathfinder Fund was established by the Government which sought to prioritise support for 70 local authority areas to develop programmes and initiatives that would challenge violent extremism at a local level and build resilience to messages of extremism in local communities.   Manchester City Council was a recipient of such funds and developed a local programme which sought to provide financial assistance to a number of projects to support the strategic aims of the Prevent Agenda.

In 2010 the Salford Housing & Urban Studies Unit was commissioned by Manchester City Council to undertake an evaluation of their Prevent programme and establish the extent to which it had achieved its goals. The assessment involved a case study approach with 8 projects, including a review of the project documentary evidence and consultation with the project leads, project participants, partners and wider stakeholders.

The findings reveal that the projects have gone some way in building resilience to extremism within the Muslim community and have developed a range of support mechanism for vulnerable community members, including unique vulnerability assessment models. However, there was less clarity about the extent to which the principles of Prevent had been embedded within key service providers or the projects had been mainstreamed. A range of good practice was identified, especially around community engagement, identifying and addressing community grievances and collaboration across the voluntary sector.