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REVIEWING HCI

HCI research in the UK: funding, reflection and the future

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The
Chartered
Institute
for IT

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The breadth, strengths and weaknesses of HCI research in the UK

12 UCD REFLECTIONS

A personal reflection on maturing in a UCD career, from user to value



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Photographers' credits will be printed if provided.

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With this year's British HCI conference fast approaching, I am minded of Gregory Abowd's keynote last year, which caused quite a stir when he suggested that the BCS HCI conference was perceived as 'CHI rejects' and that we needed to get back to our roots as leaders and innovators.

In this issue we summarise EPSRC's view of HCI, which praises our innovativeness, our multidisciplinary approach and the breadth of our influence. It points to our weakness as an inability to commercialise the research.

With this in mind, in this issue we see a call from the Chair for more theory-driven approaches, a call for more cross-disciplinary work from the field of occupational psychology, and a call for more innovation in ubiquitous interfaces.

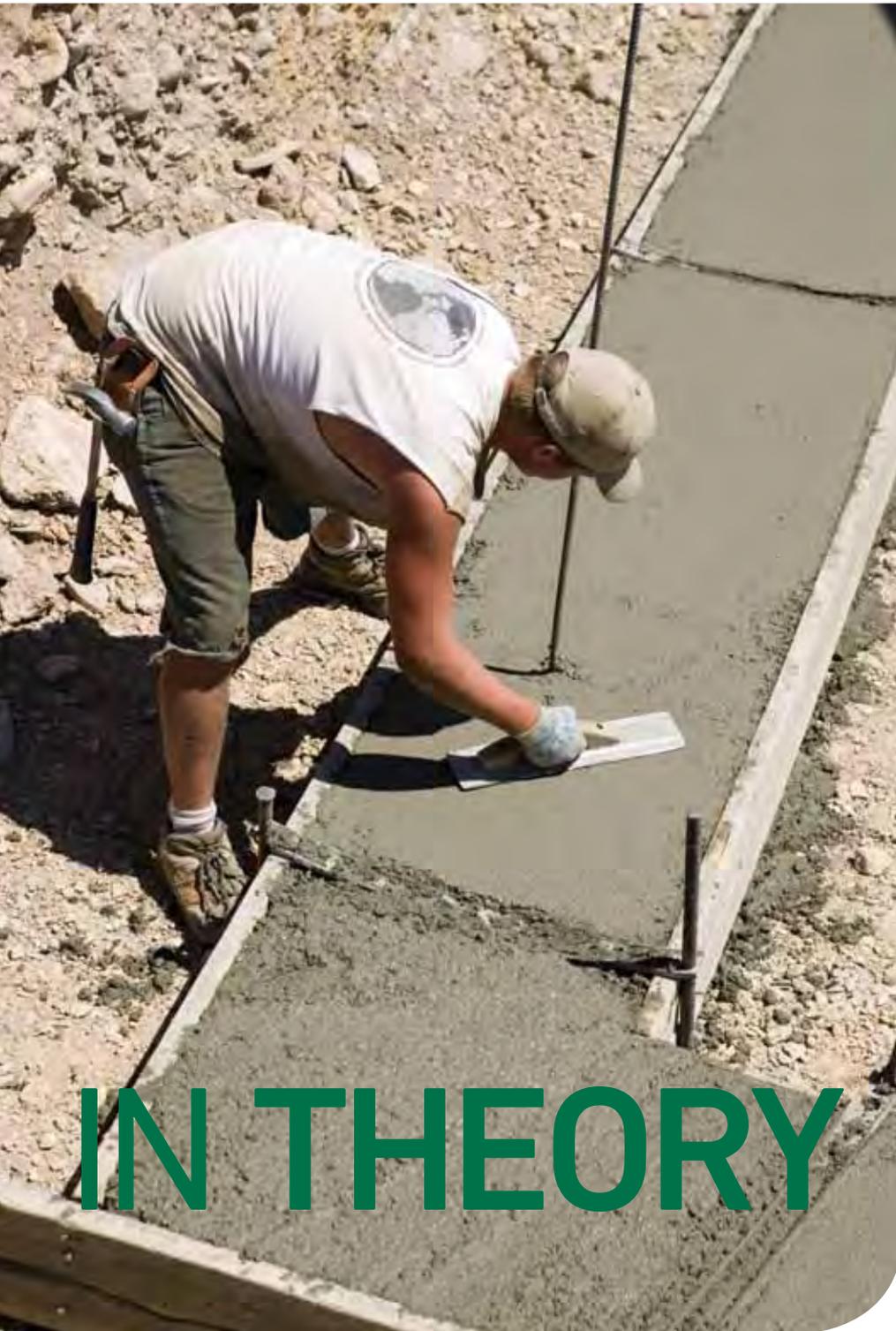
All in all, we are still part of a healthy and influential discipline. Don't forget to look for workshops and early registration for this year's conference at hci2012.bcs.org.

Lynne Coventry

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IN THEORY

Dave England, the Chair of Interaction, argues that empirical research into the latest gadgets is of limited value unless it is built on a foundation of formal models and solid theories of interaction.

Some recent retirements of friends and colleagues made me think back to the early days of British HCI when Formal Methods was a strong influence on many early researchers. From Alan Dix's book on *Formal Methods for Interactive*

Systems to Heather Alexander's PhD based on CSP, formal modeling aimed at developing sound theories on which to base interaction.

With the rise of usability methods, however, formal modeling seems to have

taken a back seat; no longer seen at HCI conferences but confined to software engineering and similar venues. Now perhaps, as Greenberg and Buxton observed at CHI2008, usability engineering is running out of steam.

Demise of usability

The reasons for the imminent demise of usability stem from Metrology, the science of measurement. In Metrology measurements can be accurate – they measure what we think they are measuring; or they can be precise – the measurements are repeatable. The problem for usability is that whereas many of the methods produce repeatable results they are not always accurate – i.e. they do not produce results that reflect reality and they fail to lead to solid improvements.

This is where we come back to formal modeling and theory. It could be argued that theoretical developments have lagged behind practical developments in HCI – hence the rush to empirical research studying the usability or otherwise of the latest gadgets. However without solid underlying theories that strand of research only gets us so far. We need to take a step back, and look for underlying models of interaction.

Lucy Suchman in the recent edition of *Plans and Situated Action* poses the challenge of the dynamic and situated nature of interaction to would-be theorists, but whereas many of our past models could only deal with static configurations, more recent work has dealt with dynamic assemblies of agents. For example, many papers in Goldin, Smolka and Wegner's *Interactive Computation: The new Paradigm* emphasise communication over algorithms. Similarly the late Robin Milner, developer of CCS, addressed situated actions in ubiquitous computing, in his last book, *The Space and Motion of Communicating Agents*.

Solid foundations

The challenge for experimenters, therefore, is to make sure their measurements are based on solid theories of interaction. By this means we will address the accuracy and precision shortcomings of our empirical work. Later in this issue Lynne Coventry discusses the implications of HCI *maintained* status as a key research area for the EPSRC. The EPSRC is also emphasising collaboration between research areas under the banner of *Working Together*. So now is the time for us to work together with our colleagues in Software Engineering, Verification and Correction and the Theory of Computation, to push forward theoretical developments in HCI.



PSYCHOLOGY AND TECHNOLOGY AT WORK

Dr Claire Hardy and John Blythe, of the Psychology and Communication Technology Laboratory (PaCT Lab) at Northumbria University, UK, explore the potential benefits of working with occupational psychologists for technology design and implementation in the workplace.

Today, the use of technology in the workplace has never been so important to business success. Psychology has had a longstanding contributory role to technology and computer system design and implementation (i.e. through the fields of human factors or ergonomics). However, it has been highlighted that understanding and considering people's values and motivations in the work place context is often neglected. One psychological field that can help to address this neglected perspective is occupational psychology.

What is occupational psychology?

The field of psychology is the scientific study of human behaviour and seeks to understand how human beings think and behave in a variety of contexts. One particular application of this understanding is in the world of work, and it is the field of occupational psychology and the role of occupational psychologists (OccPsychs) to understand how humans think, behave and perform in workplace settings.

Occupational psychology is concerned with the performance of people at work and with how individuals, small groups and organisations behave and function. Its aim is to increase the effectiveness of the organisation and improve the job satisfaction of individuals. (British Psychological Society (BPS), 2012).

The overall aim of occupational psychology is to help improve performance, safety, and well-being within the organisation, and they attempt to do this through eight broad areas:

- Personnel selection and assessment
- Performance appraisal and career development
- Counseling and personal development
- Training
- Employee relations and motivation
- Organisational development and change
- Human-machine interaction
- Design of work environments

Superseding these areas are three main levels to consider within an organisation: the individual, the team, and the organisation as a whole. Each level can impact on the others, and each of the eight key areas has a part to play. Occupational psychologists apply relevant evidence-based psychological theories and research in an attempt to help employees, teams, and the organisation as a whole perform better. This often includes designing, changing, and facilitating this change in one or several of the eight areas.

Understanding the context

In relation to technology in the workplace, it is not just about technology doing what it is designed to do, but of equal importance is whether the technology fits in with an organisation's culture or with an employee's skill level and physical and mental capabilities. Such factors can impact on whether a new technology will be adopted, accepted and, in turn, used effectively to meet performance targets. Therefore, any technology or system designed to be used within the



organisational context may find useful insights from OccPsychs.

Successful integration and adoption of a new technology or system in a workplace should ideally consider each level in order to maximise the technology's potential benefits to an organisation or individual. This consideration would apply not only to the design of a new technology or system, but also to the introduction and training of the technology to employers and employees. Furthermore, it is valuable to understand how the use of such a new technology may impact on an employee's psychological workload, performance, and importantly their well-being.

Can occupational psychology contribute to HCI?

There are many potential contributions that OccPsychs could make to HCI research and practice. Some of the most obvious contributions include working with and providing important insights into organisational level constraints and barriers around technology adoption and acceptance. Whilst increasing technology

use in the workplace may have many benefits to the organisation, in terms of productivity and reducing overheads, technology change initiatives often fail when the culture of the organisation has not been considered and the change is not managed properly.

Shared values

Organisational culture refers to the shared meanings, values, attitudes and beliefs that are created and communicated within an organisation. If new technology is incorporated into an organisation and does not match with the values of the company, the adoption of the technology change may fail. It becomes even more complex when one considers that organisational culture is an evolving and continually changing dimension of the organisation. It is therefore not surprising that when dealing with some organisational change (in which technology may play a key role), up to 70% of these change efforts may fail.

Facilitating and engaging employees to move to the new organisationally preferred state is not easy and not something

that can be done quickly (if it is to have long-term benefits). For example, where organisations decide to monitor lone or vulnerable workers with location-based services, whilst this may be perceived as a beneficial change (e.g. for safety reasons), it can have hugely significant implications for the workforce. Staff may feel as if they are having their privacy breached, especially if they have not been consulted in the introduction of this technology.

Barriers to change

These issues can create significant barriers to change. Research shows that such barriers and issues can have significant consequences for important work outcomes, such as the psychological contract between the employee and the organisation, and consequently organisational commitment and job satisfaction. The latter are consistently linked to individual and organisational performance, and employee retention.

By utilising an evidence-based approach, OccPsychs would work closely with key stakeholders in the change

initiative to identify potential barriers for change adoption prior to technology implementation. This may also involve assessing the technology readiness of an organisation and its employees, and helping to design and deliver any training necessary to promote the technology readiness. So understanding and incorporating important occupational psychology concepts such as organisational culture, and organisational change and development, into any HCI project focusing on the workplace could improve the likelihood of success and adoption of their new system or product.

Understanding other organisational practices and structures (such as team work, leadership, training, assessment and selection, as well as important organisational outcomes such as job satisfaction, stress, well-being and organisational commitment) are other useful aspects of the organisation to consider in HCI research and practice. Not only for performance and adoption of new technology, but because evidence collected around these issues can help provide a useful business case for a new technology or system.

Direct contact

Another potential benefit of working with an OccPsych on an HCI project is that this group of applied psychologists often work directly with organisations. This can have two useful benefits: firstly, they can have direct contact with organisations, which can include discussions about their technical problems and issues that they feel require more research. This direct contact allows first-hand experience of areas where more research and development is needed from the perspective of employers and employees. Additionally, this will also help bridge the gap between research and practice.

Secondly, OccPsychs can provide a useful contact point through which to inform organisations about new technologies or systems, and potentially to utilise and investigate such technologies when attempting to solve problems for an organisation.

Returning to the issue of neglecting individual values and motivations in the workplace, the OccPsych is ideally placed to understand these forms of individual differences, and how they can not only impact on technology, but also affect their peers, supervisors and the organisation as a whole. The area of personality and individual differences research is one of the most developed areas in occupational psychology. There are well developed theories and understanding of workplace personality traits, skills, abilities and motivation. This places OccPsychs in

an ideal position to comment on such neglected issues and help inform any HCI technology for work project.

The future of HCI and occupational psychology

With more and more technology being incorporated into people's job roles, it is anticipated that the worlds of HCI and occupational psychology will be more collaborative in the future. These collaborations could take place either in universities through research or in industry.

As discussed in *EPSRC Review* on page 10, the meaning of HCI continues to change and it is important for HCI to maintain a focus on the work environment. Without consideration of the working environment and the areas discussed in this article (i.e. employee, team, and organisational levels) technology implementation may prove difficult in HCI research.

An untapped resource

Although HCI is a core area for occupational psychology, and some who study this subject go on to become ergonomists or human factor specialists, it appears that OccPsychs remain an untapped resource for HCI specialists. There are already growing trends in occupational psychology. For example, the ageing workforce and the impact this can have in an organisation (and society) is a topical research focus. Occupational psychology has looked at the ageing workforce from the view of impact on performance (at the individual, team and organisational levels), training, and selection and assessment, to name but a few. The role of technology in the ageing workforce is therefore important to the field of occupational psychology, and collaboration with HCI would be worthwhile.

Other growing trends in occupational psychology include the use of technology for remote working, work-life balance and the blurring division from technological advances, cyberbullying and security, online recruitment and selection processes, and ethnic and diversity issues. The role of e-learning for training and career development is another topical area. All of these themes map onto the HCI field, and potential contributions from the HCI field are clear. Therefore, HCI researchers and practitioners may wish to explore these trends in the future and collaborate with OccPsychs to help better inform solutions to problems that relate to workplace productivity and health. Some suggested further reading about these trends and research is provided in the references for the interested reader.

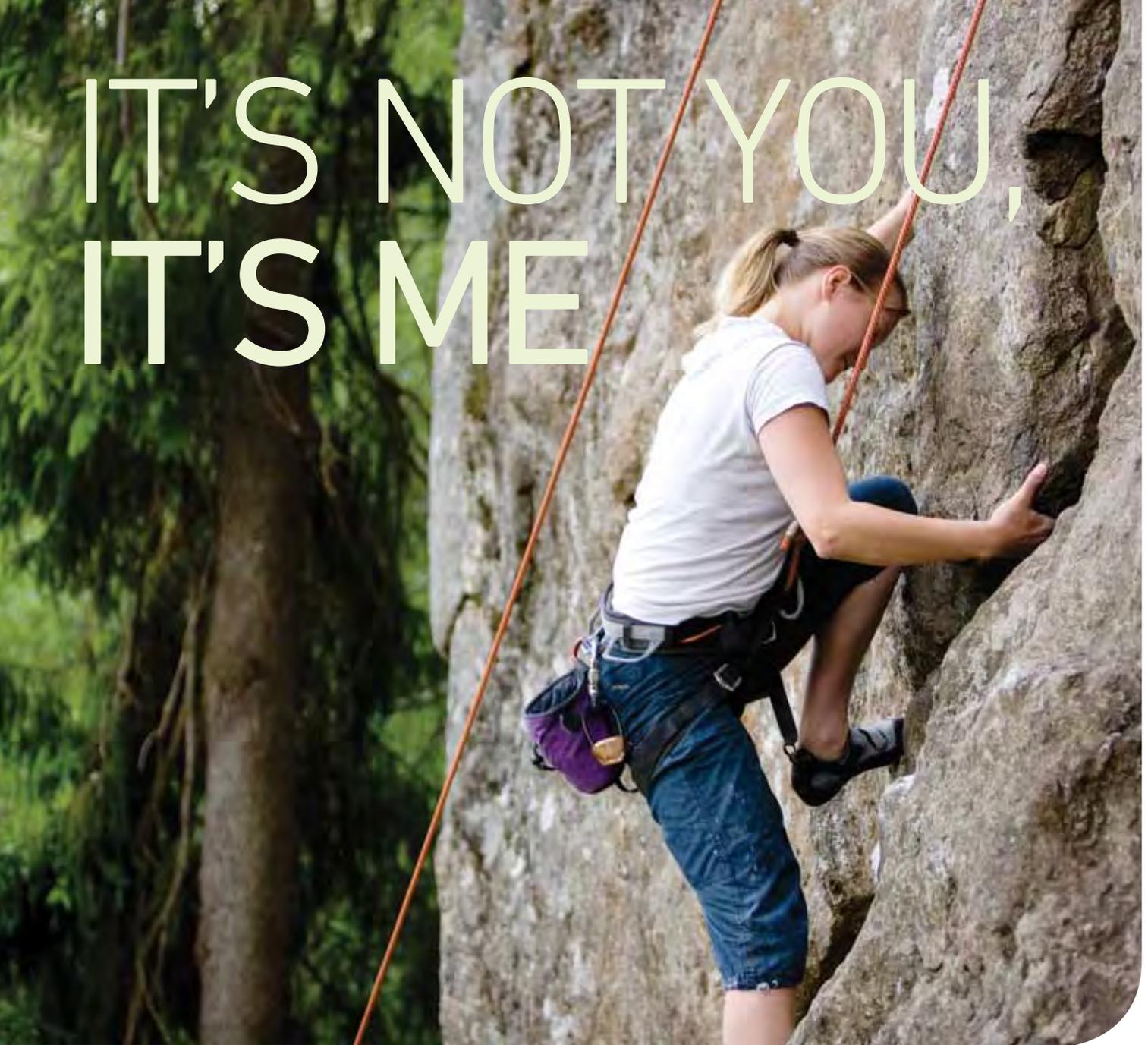
It therefore seems unavoidable that the

paths of HCI and occupational psychology research teams and practitioners will cross in the future as technology and work become more entwined. OccPsychs can provide another useful perspective and knowledge area expertise that could create a more in-depth exploration and understanding of technology and people in the workplace. Any technology or system that has implications for the workplace would benefit from seeking the specialist knowledge of an occupational psychologist. Collaborative working will therefore help to address the neglected issues from previous work and practice.

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IT'S NOT YOU, IT'S ME



Stuart Cunningham, Glyndŵr University, reflects upon our increasing demand for personalisation and invites your thoughts on the need for 'pervasive interfaces' to make pervasive technologies more successful.

A fantastical scenario – Utopia?

It's been a tough day in a typically busy week. I found myself marking 60 student papers today and having another debate with one of my PhD students about why he should make some more changes to his thesis before thinking of submitting.

But thankfully, today is Friday. I arrive home and breathe a sigh of relief. Seeing the look of downtrodden despair on my face, my compassionate wife gives me a hug before instructing me to don my smoking jacket and slippers (hey, this is *my* fantasy). She then puts a cold beer in my hand and sends me into a mood-lit lounge to listen to

my favourite Pink Floyd album (*Dark Side of the Moon*, if you're interested) for some valuable, well-deserved relaxation time.

How hard can Utopia be?

Sounds pretty good, yes? I hope you didn't mind indulging my personal preferences. We all have individual things that make us happy, I'm sure you'll agree. The point being: it doesn't take much to make us happy. And if we can achieve greater levels of happiness, Maslow's *hierarchy of needs* (1943) suggests we reach our full potential when more basic needs for satisfaction have been met. So why not make the simple things simple? That's often what we do when we develop new technologies and attempt to make them usable and

accessible. Pervasive technologies, it could be argued, epitomise that goal.

With technology becoming more pervasive and ubiquitous, this short article suggests that interfaces are starting to lag behind the technology and may even be holding up the adoption and advancement of incredibly beneficial gadgets.

Success comes at a price – you!

Some of the critical success factors, responsible for the explosive growth of home computing in the last fifteen to twenty years, have been: effective product design; reduction in manufacturing costs; the mass software market (*née* 'general purpose packages'); and improved usability.

Delivering software and technology for mass markets has forced improved

usability and made software cost effective. However, as any politician will tell you, 'you can't please all of the people, all of the time'. As with many other successful trends and technologies, once the hunger of consumerism has been satisfied, the consumers themselves feel the need to express a sense of identity. This takes the product to a new level and it starts to become integrated into society and culture.

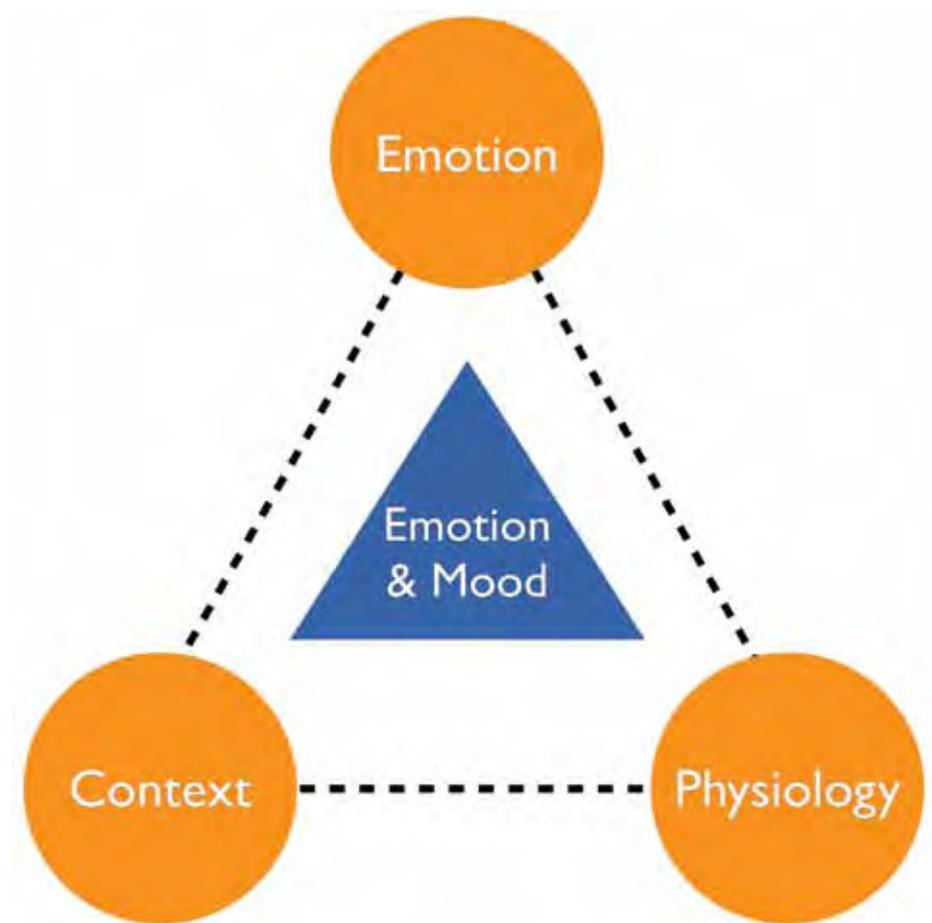
The bulk of interfaces and software we now use have been designed to give you limited customisation options. Much like a car; you can choose the colour, interior, engine size, etc., but at the end of the day, your car is still going to look and feel much like all the other models on the road. Personalisation and customisation have become expected features of contemporary products, even software, regardless of how ephemeral or indefinite it might be.

How we interface with technology that is striving to become more pervasive presents challenges of its own. As traditional forms of interface are minimised to afford technological efficiencies in terms of size, cost, and resource, the opportunity for personalisation can be diminished.

Pervasive Human-Computer Interaction (PHCI)

With technology playing such a key part in numerous aspects of our lives, and likely to increase as we move into the future, more subtle and responsive modes of interaction are needed. Most of the interaction we currently have with technology requires a conscious initiation or action. The concept mooted here of *Pervasive Interfaces* suggests a move to formalised modes of communication with devices that are automated, intelligent, and those that are triggered by unconscious interaction. It's worth mentioning that the removal of human control is not being advocated, just that an act of deliberate intervention is not mandatory most of the time.

Remember the opening, Utopian scenario? When I get home after that hard day at work, consider a modification where my home automation system logs my mood and emotion as I open the door. My smoking jacket and slippers are ready for me to put on and, as I do, the intelligent fabric provides me with a warm, caressing sensation. Moving through the kitchen, the display on the fridge highlights a cold beer waiting for me on the second shelf, and as I enter the lounge the lights dip, my digital music collection has been pre-selected and I'm enjoying the sound of my favourite music. Bliss. I suppose you're wondering what happened to my wife? The television informs me she is happily enjoying the



essential oils bath that was prepared for her when she got home!

Climbing the digital mountain

The big question provoked is: how do we achieve this goal? Clearly there is a major role to be played by sensor technologies and these probably have to become smaller, more discreet (or trendy) and robust. Making personalisation automatic and technology uniquely responsive is no mean feat. Gauging the emotional condition of the user and their likely activities 'on the fly' isn't easy either.

There is a big role to be played by artificial intelligence. Let's get the shameless plug out of the way: in particular, I'm a big advocate of the importance of content, context, and physiological analyses in order to better predict emotional state (Cunningham et al., 2010). By triangulating objective indicators of these three, I believe we can move towards highly accurate predictions of mood and emotion, resulting in information that can drive a pervasive interface. Gesture recognition will be vital, so too the ability to analyse digital sources of information (such as SMS messages sent to my wife during that particular day above), as well as historical preferences and trends that have been self-selected.

Ultimately, however, there are also

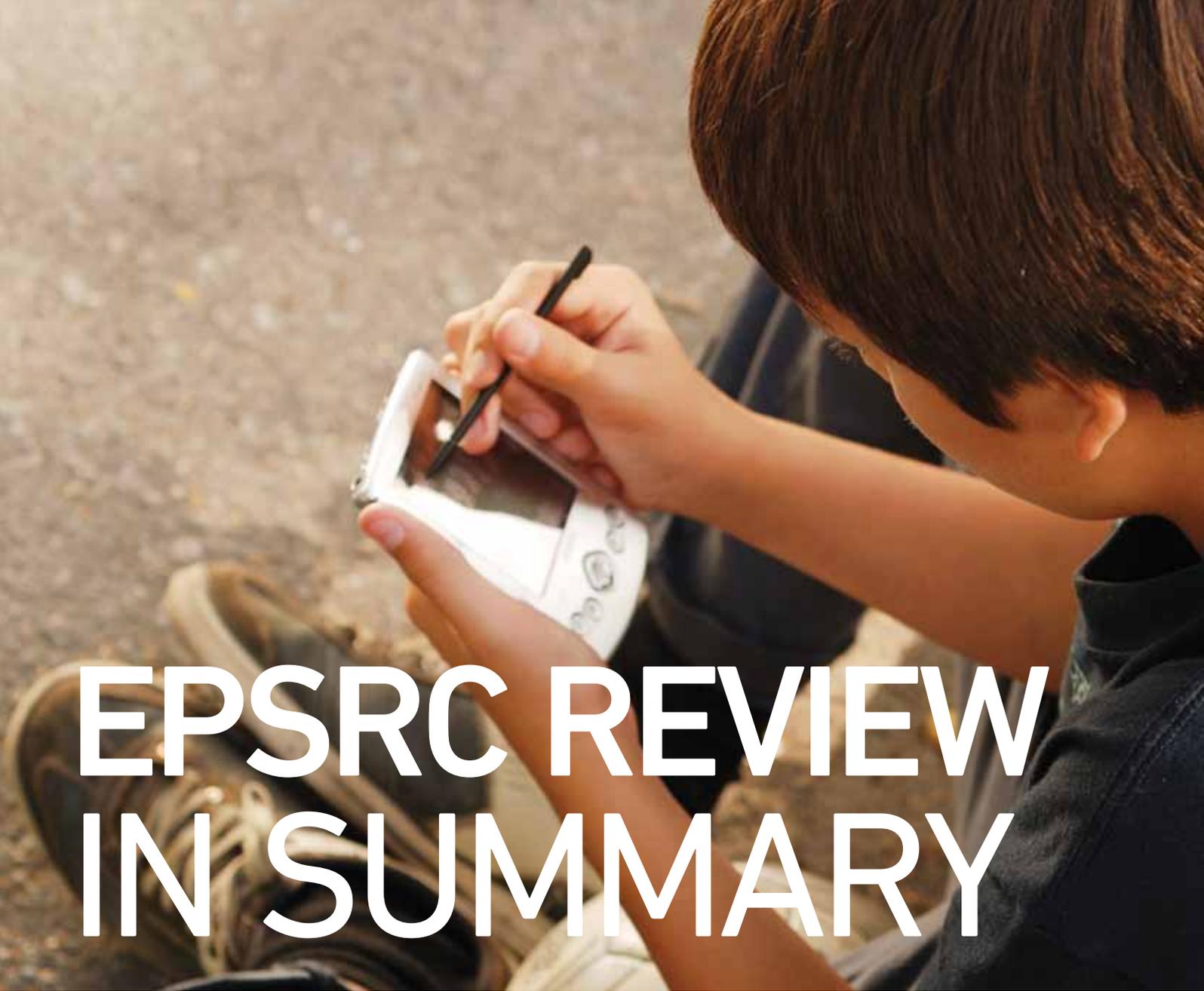
the ethical and engagement issues. Clearly, indicators of mood and feeling are sensitive and personal. However, countless people are quite free and easy with openly expressing feelings on social networking sites. Still, there is a need to ensure users are comfortable and secure in this information being in the digital world.

And finally...

What's the moral of this story? Don't settle for second-rate usability. In the same way as you are free to express your individuality with clothes, music, books, and so on, and have people respond to these statements, let's make pervasive technology truly transparent and adaptive to the needs of the individual. Be a little selfish. Make it all about you for a change!

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EPSRC REVIEW IN SUMMARY

Lynne Coventry, Northumbria University, briefly summarises the findings of the EPSRC HCI review panel.

In March 2012 the EPSRC published their review of HCI research in the UK. This review was undertaken by a panel of experts from academia and industry. The panel had various sources of information available to them from the EPSRC (see references) including a summary of funded research, discussion with a broader set of the HCI community in a Theme day (61 participants in the Theme day), and results of a survey of HCI researchers. The panel started by summarising the current nature of HCI research in the UK, and identified and discussed major sub-areas of HCI; and then based their assessment around six key questions. The full results of this survey can be found in the references. This article provides a brief summary of the findings.

What does HCI mean to today's researchers?

Let's start by summarising the panel's view of how the nature of HCI research has changed over the years. The world of

HCI has significantly changed as a result of new applications and devices being integrated into our everyday lives, leading to new types of users to design for. This means that the **H** has expanded from referring to a single person in a work context to different groups – even crowds – across the entire age range, abilities and disabilities. The **C** has also radically changed from a large computer hidden in a clean room with users at terminals, firstly to desk tops and now to being hidden in the cloud or embedded in other objects including our bodies.

Therefore the **I** also needed to change drastically from keyboard and screen to interaction by an individual via a multitude of devices, to interaction within the body, between bodies, between everyday objects – in public and private places. The **H** no longer has to deliberately engage with the **C**, much of the **I** is covert, activated on the **H**'s behalf, and we may not even realise we are interacting. The role of interaction has diversified from improving

workplace productivity to self expression, building communities, entertainment and much more.

Sub-areas of HCI

In an attempt to encapsulate the diversity of HCI research in the UK, the panel identified six categories of research:

- 1 **Theories and models:** developing new frameworks of understanding.
- 2 **Evaluation:** techniques to engage users and develop greater understanding of the interaction.
- 3 **Understanding users:** techniques to explore the needs, experiences, abilities and attitudes of different user communities.
- 4 **Building:** designing and developing solutions.
- 5 **Extending interaction:** into new modalities, sensors and devices.
- 6 **Ethics and implications:** individual and societal implications of new uses of ICT.



influential HCI community in the world. CHI statistics quoted in the report include that, between 2007 and 2010, UK authors account for 10% of CHI papers – far more than any other European country; 12/77 CHI Academy members are British; one of the 17 lifetime achievement awards was bestowed on a British researcher and two of the eight social awards have also gone to Brits.

From a different perspective, the UK is second in the league of the top 50 cited HCI articles since 2007, with 20% written by British-based researchers, and this is increasing.

Innovation

How innovative is the UK HCI community in developing new research and research methods, to identify challenges, engage others, stimulate creativity, innovate and work across boundaries?

The panel believe that the UK is distinctively innovative with its strength coming from its diversity and multidisciplinary nature. However, the ability to turn innovation into commercial outputs is identified as weak. The evidence used to reach this conclusion includes the number of new communities of interest that have been established by British researchers; the number of different disciplines involved in HCI grants and the number of non-HCI grants involving HCI practitioners (resulting from a requirement to embed the end user in research), and the fact that four of the Digital Economy Centres for Doctoral Training have an HCI element.

The creative element is measured through the number of artists and designers and others from the creative industries who are now engaged with HCI research. 75% of successful HCI grants have been rated as most creative/transformational compared with 43% of non-HCI grants. The UK's innovation is also recognised by international companies' location of creative R&D labs in the UK, and the employment of UK HCI PhDs within many international companies.

Societal impact

To what extent has UK HCI research addressed key societal and technological challenges?

The panel identified HCI research as an enabler for many other aspects of research. The Digital Economy, Healthcare, Energy, and Family and Home creative industry projects have a high level of HCI involvement. Manufacturing is the only domain with zero projects with HCI involvement (an area traditionally represented by Human Factors and Ergonomics). This is seen as an area that could be developed in the future.

There has been some criticism of this division as each category does not exist in isolation and many researchers work across multiple categories, but it was generally accepted that people have a primary focus. The remainder of this article will present the answers to each of the six key questions.

Internationally leading research

To what extent is the UK HCI research portfolio internationally leading?

In response to this question the panel concluded that UK HCI research is internationally competitive, and in some cases second only to the US, and that our international profile has been increasing over the last five years.

This conclusion is supported by evidence drawn mainly from the CHI community, and a criticism could be that this is not representative, as other sources exist, including the IFIP and the Interact conference. However, the CHI community is perceived by many to be the most

Challenges and barriers

What future challenges can UK HCI contribute to, and what are the barriers to success?

The panel recognised that UK HCI needs to be encouraged to create bolder and transformational research. The next set of challenges was identified as the need to think BIG, but there are barriers to overcome with such an approach, including the problems of managing large consortia; long-term funding requirements and management of associated risks.

HCI also has a role to play in the design of technological interventions to promote behavioural change and associated ethical issues. These can be applied in numerous domains including health and energy conservation. HCI needs to research the new area of digital exclusion as we move from ageing and disability to youth unemployment. HCI will also need to develop new relationships and collaborations with communities such as materials engineering, as interaction becomes more embedded. Lastly the challenge of commercial exploitation of user experience research still needs to be addressed.

Maximise impact

To what extent does the UK research community maximise the potential impact of HCI research?

The panel noted HCI's weakness in the area of commercialised outputs but believes there is inadequate provision of mechanisms to exploit research. The panel believes that entrepreneurial training may help and TSB funding could be better aligned to achieve such commercialisation.

Quality and impact

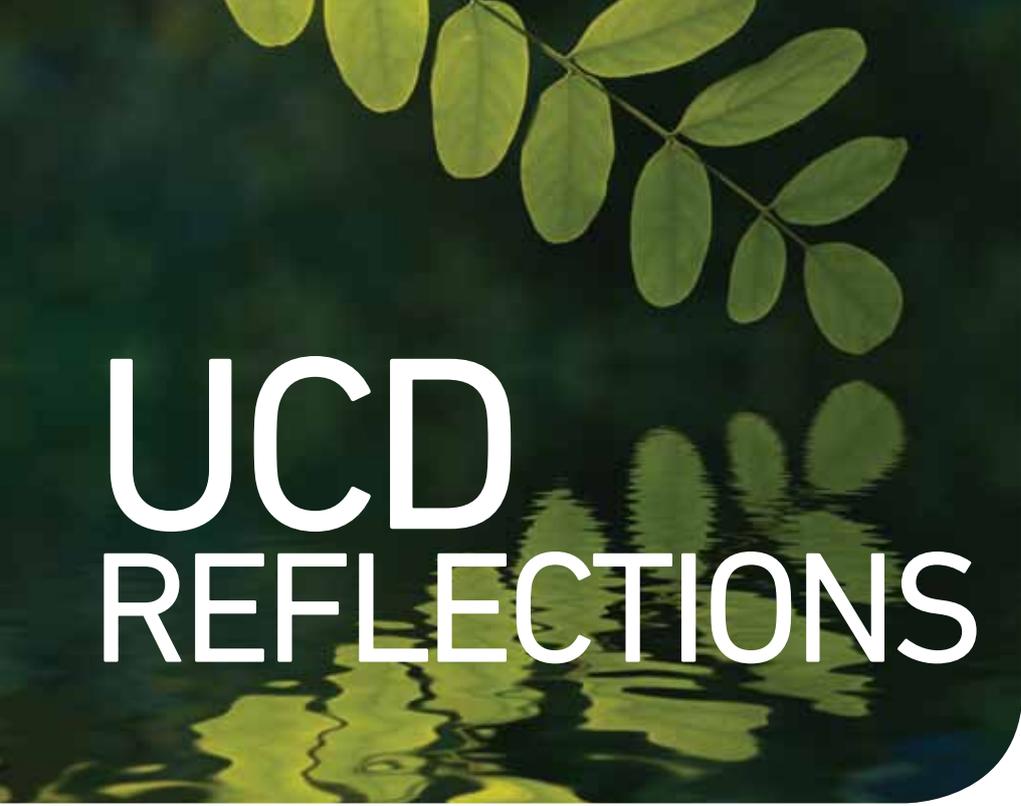
Is the EPSRC HCI research portfolio appropriately balanced to maximise its potential in terms of quality and impact?

This question highlights the large percentage of EPSRC funding held by a small percentage of institutions. The portfolio covers a wide range of societal challenges. However, the panel believes that the sub-area of Theory and Methods is particularly under-represented in the funding landscape.

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EPSRC funding of HCI projects is available here:
www.epsrc.ac.uk/ourportfolio/researchareas/Pages/hci.aspx

Full panel report and theme day report is available here:
www.epsrc.ac.uk/newsevents/pubs/reports/Pages/ict.aspx



UCD REFLECTIONS

UCD practitioner, John Knight, of Aalto University of Art and Design, Helsinki, offers a personal perspective on user-centred design.

I recently had the time and inclination to reflect on the design and research projects I have worked on over the past twelve years, and which have had the biggest impact. Reflecting on the range of clients I have worked with and the variety of deliverables I have produced I was struck by the fact that often the most significant product of user-centred design (UCD) is not what you might expect – improving the usability of a product or service – but rather a strategic change to the sponsoring organisation itself, although some had done both.

To put it another way, UCD often changes a client's perspective on what they do. Usually clients start off thinking their prime business function is to deliver a marketable piece of technology and then shift to realise they design and deliver user experiences in whatever form that requires. This does not mean that every successful company does UCD but if you can find a non-UCD oriented and successful enterprise it will be an emphatically design-led one. Rather than undermining the value of UCD these examples highlight another significant impact of UCD for organisations; integrating design into the business function within a grounded research and development process.

This kind of impact is difficult to measure or even document and the change can take time to become embedded in a company's practices and the products and services they provide to their customers; but it's a change that is difficult to shift once it has happened. To illustrate this and give some insights into how my perceptions of UCD have evolved over the years, I will take the reader on a

somewhat personal reflection on UCD.

New technology

My career started in a traditional IT role, but I was less interested in the details of technology. Instead I was interested in what 'it' (rather than 'I.T.')

could do, and what change it could effect, and especially how people's jobs and work could be radically affected by automation. This was due partly to having a more design/people oriented background than my more tech-savvy peers but also to a pragmatic realisation that I would probably not make the best programmer.

So it was this humanistic concern, as well as hope that technology could improve the world, that bought me to UCD, applying to the course purely on the basis of appealing keywords in the prospectus such as 'user-centred design', 'usability', and 'interaction', as I only roughly knew what most of them meant. Conversely, UCD did not seem to be a fuzzy design-led subject where it was just about ideas but rather a practical discipline rooted in the real world of systems development.

Naive UCD

My naive view of design, twelve years ago, was that it was something that solitary trendy types did and applied to 'designer' things like graphics, clothes and luxury goods. Then design was really about the aesthetics of things, and anything functional was the realm of engineering, which was logical rather than emotional. As I got to do more design I found that design was fundamental to human activity, a key business function and a valued addition to engineering, technology and indeed business.

As a product manager I was involved in the various work practices and somehow became involved in the Management Information System deployment and despite the demonstrable capabilities of these off-the-shelf systems, and clear advantages over ad-hoc paper based processes, uptake was patchy. I noticed that most managers kept to their paper record keeping and mistrusted computerised systems, even accounting and resourcing packages that could do things impossible with paper such as making instant recalculations by changing one variable.

I investigated this more deeply by talking to my peers and found that paper-based systems were often quicker, easier to share and generally more usable and did not require the ramp-up of learning. Most importantly everyone used them and they did not infer or require different skills. I was tasked with improving adoption of the systems, as without managers using the software not only was the investment lost but its impact negligible. I worked to improve the design, but despite some rudimentary redesign of these systems I never broke the barrier to adoption and it was this problem that led me to UCD.

Improving the user experience

I guess like anyone unfamiliar with UCD I framed this problem as a technical one and focused on solving it with what I could achieve with a technical solution. As an experienced practitioner I can see now that a more holistic approach would have been more successful and easier to deliver in the sense that as well as tackling the design of the system I could also improve adoption by involving users directly in a project and looking at other issues such as help and support.

I did involve my colleagues almost by necessity but not to the depth or sophistication that I would now. I found that optimising functionality of a system designed for general purpose use did not change behaviour; users were ambivalent, sceptical and sometimes afraid of the very technology that could save them time and effort. At the same time being a co-worker allowed me to gain the trust of other users and to understand their difficulties at first hand, which certainly helped.

This project provided many insights into how to make a positive change – or not. It is worth reflecting on these insights both at the level of practical guidance and its wider implications starting with the more pragmatic lessons this project suggested:

- Increasing adoption is potentially where the biggest change can be effected by design for software and productivity tools rather than later

- stages that have less impact on use;
- Improving adoption is not a purely technical issue, in fact it is mostly a behavioural one that needs behavioural solutions like training;
 - New technology has to surpass the quality of whatever it replaces and in this context quality is user-defined rather than by the technology sponsor; and
 - Knowing how your own experience and values frame a problem enables you to find more holistic solutions, have more impact and learn.

While my first experience in user-centred design could be viewed as a failure, it opened my eyes to a discipline that could make it a success through a repertoire of tools and methods and theoretical frameworks for evaluation and measuring impact. Had I had more experience I would have been able to have a much bigger impact with more control of the outcome by applying a UCD process along the following lines:

- Gather user requirements via user research methods, for example contextual inquiry.
- Produce low-fidelity conceptual designs, for example paper prototypes and sketches.
- Iteratively test and refine the concepts with users, for example usability test screens.
- Develop hi-fidelity UI documentation, for example wireframes, and validate with users.

As well as practical tools UCD gave me a valuable perspective; that technology is not something remote and unchangeable but has to be something tailored to the needs of its users.

Into usability

I took the post of Usability Engineer at Birmingham Institute of Art and Design. A usability lab in an art and design faculty – that juxtaposition was strangely liberating; it was unclear where it might take me. An engineer of any kind was also an odd job in a design institute. Usability was something done by psychologists, human-factors specialists or computer scientists, but not designers. So just living up to the job title was a chance to do something radical, new and different.

One of my first jobs was to deliver a business plan based on commercial UCD services. My intuition was that UCD was a critical and valuable asset to any business and fundamentally important to brand allegiance (Knight and Jefsioutine, 2004) as it put the customer at the centre, but there were also limitations in the way

that UCD was delivered, namely that they focused on removing usability barriers rather than providing value-adding features and functions – as design does.

As I started to deliver more substantial UCD projects to clients I found I needed to convince them that the approach was a good one. To do this I referred back to core 'laws' of UCD which have been validated through numerous papers and cases (see Knight and Jefsioutine, 2002b) in order to show the kind of impact it can have:

- User involvement is a risk and cost reducer;
- Usability testing – early and as often as possible;
- UCD – involving users as an equal participant has the maximum impact on risk, quality and return on investment; and
- What is best for the user should be the overriding criterion in any decision in a project and will drive adoption.

These laws or principles have high levels of validity as they derive from real-life cases and practice over the past thirty years. The ROI for usability studies is well documented and the underlying principles of user-centred design enshrined in *de jure* standards such as ISO 9241 (ISO, 1998). Most of these principles identified usability testing as fundamental to the approach and core service provided by consultants, agencies and in-house teams – and it still is.

A typical project of this kind would involve recruiting participants, matching the audience profile, conducting tasks with the product or service (usually a website), recording the interaction and then conducting quantitative analysis of the results, such as the number of errors. As I found generally, the biggest impact of UCD came when using this technique with first time clients. Other methods had an impact on the quality of the experience, and sometimes strategy too, but usability testing was what changed minds. The experience of watching actual users interact with a company's products usually convinced them that they needed UCD, and the higher up in the company the person was, the longer and deeper the impact.

While the case for UCD was solid, I saw some risks for its future and in particular thought that usability was a troublesome concept for a number of reasons. From a consumer perspective, usability is clearly an important quality to look for, but ultimately it is a hygiene factor rather than a decider; in other words people only notice usability when it is absent but do not consider it as important as other factors such as cost, quality and in

some cases aesthetics (Jordan, 2000). A more sustainable approach would be to consider usability as a component of a wider set of use qualities that together define customers' needs, but this holistic approach was a difficult sell to the competing disciplines of design and usability respectively. There were other problems that bothered me too:

- Focus on problems – UCD tends to concentrate on removing usability problems rather than delivering innovation and strategy that potentially go beyond the stated problem or need.
- Focus on use – UCD often focuses on one part of the product lifecycle/ consumer journey whereas adoption and retention goes before and after usage.
- Tendency to standardise – in focusing on usability problems UCD tends to advocate common solutions such as standard UI components even when they might be sub-optimal, rather than exploring the best solution to the given problem.
- Functional bias – at both a practitioner and delivery level UCD converged around a logic-based view of the world and its approach to problem solving reduced more human/emotional needs from analysis.

Value-centred design

I could see UCD needed some kind of refocusing toward a more innovative model of design in order to make it more relevant to business development, and more importantly to maximise its impact. This change was also needed to bring the different disciplines together in a smoother and more efficient way (Knight and Jefsioutine, 2002a).

It was not long before I got my chance to move from UCD to what has been termed Value-Centred Design (Knight, 2004). At first sight 'value' seemed a more practical and useful principle than 'user' did, as value limited neither the focus of inquiry to use, nor the definition of quality to usability, but enabled a longer and deeper research and design agenda. Through research and collaboration I created two frameworks for understanding the user experience. These were designed to account for use quality beyond usability and modeling the customer journey as a temporal and multifaceted relationship.

The Experience Design Framework (EDF) (Jefsioutine and Knight, 2004) was developed to frame UCD projects. A key aspect of the EDF was to define a holistic set of user needs as tangible design goals and experience qualities. Our research

suggested that customers' interaction with their products and services was through a number of dimensions including qualities such as utility, engagement, value and even aesthetics and that these worked together somehow (Molotch, 2003). Focusing on one could negatively affect another and therefore the success of the interaction. A crucial insight was the importance of the temporal aspect of interaction – it takes place over time. This means that research and design needs to account for how the experience changes with time, and integrate this process within the product or service, as opposed to traditional usability studies, which tend to focus on first use. Since then I have continued to develop the framework while at Aalto University and in my professional practice, refining the elements and making it a more practical design tool.

An ethnographic turn

One practical outcome of this approach was to integrate ethnographic style research (Heath and Luff, 2000) into the lab's methodology. In a number of my projects the overall aim was to evaluate different kinds of interactives in a museum setting but the research method uncovered much more than this. Using shadowing techniques and a range of data collection instruments, including video, the project could effectively map users' interaction not just with the interactive but with the gallery, other visitors, staff and artefacts such as audio guides. These projects were instructive and are relevant here because measuring the impact of ethnographic style research is difficult and arguably misplaced, as the outcome is insight rather than diagnostics, although they can emerge too. The value that clients got from such engagements was a deep understanding of their audience and their relationship to them, and I have continued to apply this approach to subsequent projects, including cross-channel mobile service design, in-store retail sales tools, and an online brand asset library

Evidence based design

These and other projects went toward forming a distinctive perspective on design research built on the following principles and design methods (Jones, 1990):

- Quality and time – ensuring that any research or design activity accounts for how interaction changes over time and the constellation of qualities relevant to a particular product and service, and also what is needed to support users along this timeline and realisation of value, often using ethnographic rather than lab research methods;

- Triangulating research – using a combination of methods together to maximise insight and validity and minimise costs. For example, using card-sorting, contextual inquiry and traditional interviewing techniques in one session rather than several, and validating this with analytics;
- Design focus – using research findings to build up a picture or develop evidence to support design(ers) in whatever form is most efficient and can be communicated most effectively. For example, including designers in user research so they build up empathy themselves rather than giving them a written report to read through.

Before concluding, I will summarise the key services that I continue to deliver to clients because they are the ones that provide the greatest value.

IDEAs visioning workshops

Identify and manage potential conflicts

Discuss risks, gaps in knowledge and potential solutions

Explicate differences in values and goals

Agree an overall vision for the project and its deliverables

Ethnographic style research

Use ethnographic style research including shadowing and diary studies

Conduct in-situ interviews and research collecting diverse data

Work with a cohort of representative and/or extreme users and non-users

Co-design and co-discovery

Work with users to develop and validate concepts

Check trade-offs and key decisions with users in design workshops

Don't design by committee or merely translate user created solutions into workable ones

Analytics and behavioural research triangulation

Extract actual metrics of actual usage wherever possible

Conduct user research in tandem with analytics and triangulate findings

Validate analytic findings with user feedback

Recursive design

Keep a design (rather than insight) focus from start to finish

Focus and revisit key use cases, journey and screen

Continually document and refine potential solutions

Conclusion

Having started as a naive UCD practitioner I moved from tackling the implementation of new technology to studying user-centred design, which gave me the theory and methods to understand and design accessible, usable and engaging user experiences. Applying this to a range of design domains I now embrace a value-centred design approach, which is characterised by the services I deliver and continues to evolve as I encounter new challenges.

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SUPPORTIVE RESOURCES

Vicky Teinaki, Malcolm Jones, and Michael Leitner, School of Design, Northumbria University, question the nature of qualitative user studies as applied to experience-centred design, and put forward an alternative of supportive resources to frame and guide the design process.

Introduction

Designers face a twofold issue when it comes to the use of qualitative user methods – identifying potentially valuable material, then transferring this material into a design context.

This is further complicated by the material being captured in a range of forms and media that designers cannot interpret directly for their use. These issues of sense-making and language arise in any situation where design draws on external materials. 'Knowledge' produced in qualitative user studies is just one of many assets on which a designer will base his or her design decisions. Our research deals with gathering insights

that support designers doing their work. We are concerned not only with identifying and gathering information and insights for design knowledge production, but supporting their use by design through processes such as selecting, editing, and interweaving them into the design process. We call these *supportive resources* (expanding on Woolrych et al. (2011)).

A key foundation to our research is questioning the efficacy of classical social science based on user-centred methods that have typified contemporary design research. We are cautious about the use of terminology that tends to be associated with these methods such as 'knowledge capture' and 'knowledge transfer'. While

methods that claim to support design have been systematically improved over the past four decades, they have also become prescriptive (prescribing procedures that are considered 'good'). This gives a false impression that if these methods are used, 'good' design outcomes are guaranteed. They also suggest repeatable, predictable results: one only needs to apply it and voilà. This, we propose, does not adequately serve the needs of contemporary design work.

As part of the *Making Sense Through Insights* design theme at Northumbria University, we adhere to a common research approach that focuses on helping designers make better sense of those they



serve and the situations they encounter by providing new 'insights'. To better support design methods, our work takes a Research for Design approach. We focus on identifying ways to support design beyond 'knowledge capture' or 'knowledge transfer'. We support key design activities, such as *framing* (helping designers decide for whom they are designing and for which purposes), *guiding* (helping designers to navigate design situations), and *choice support* (helping designers make informed choices).

Supportive resources

Getting the right story and the story right

As design has focused on the complex challenge of understanding the 'user',

it has inherited another challenge – working with representations of users and experiences. Stories have emerged as an effective form of user and experience representation (Quesenbery & Brooks, 2010). Numerous storytelling methods and tools are available to designers, yet one of a designer's greatest challenges is to get the right story and the story right. The challenges include: gaining understanding to choose which stories to tell; choosing appropriate forms of representation; managing the evolution of stories (including evaluation of the effective transfer of value statements); and translating stories from one form or modality to another. A survey of the literature suggests that support for competencies in storytelling and story

management lags behind support for methods and tools.

An example of a situation in which these challenges become extreme is when textual scenarios are transcribed into 'naturalistic storyboards' (see Figure 1; a sequence of images with human participants that are 'akin to story-writing'; Kress & van Leeuwen, 2006, p62). Our project aims to develop a set of storytelling knowledge resources that support designers' understandings of how story, narrative and scenarios work in design. The resources are envisioned as a loose collection of game-like activities that simulate design storytelling situations. It is proposed that this will facilitate informed choices and lead to more effective use of existing scenario-based approaches.

Increasing designers' expertise in touch through language

In research on design and language, especially in relation to touch, attention is generally focused on users rather than designers (for example Dagman, 2010). However, language is a key part of knowledge acquisition in apprentice-based learning (Seely Collins et al., 1991). It is a means for novices to pick up the vocabulary of experts, and understand how to evaluate their design choices. Part of the difficulty surrounding language and touch is its situatedness (for example McCullough, 1998): touch, unlike other senses such as vision and sound, is personal and exploratory, and thus a less likely candidate for discussion.

This project looks at ways to both collect and encourage a vocabulary relating to touch. By collecting the language of designers in various stages of their career and in different disciplines, it will help to create a framework with which designers can both acquire the vocabulary used by other experts and also understand how their use of language can help make more informed and reflexive design decisions.

The project will also use video to both collect and disseminate information. Videos will act as a decision-making resource by enabling designers to become more aware of the role of language without dictating the use of rigid dictionary terms.

Material representations of knowledge

Research techniques like cultural probes (Gaver, 1999) help identify 'what to design'. Cameras, postcards, maps and voice recorders are ways to collect user-generated data. One current project explores the use of materials for insight collection and representation, specifically looking at mobile device experience. People are encouraged to reflect on their experience by sewing their paths and

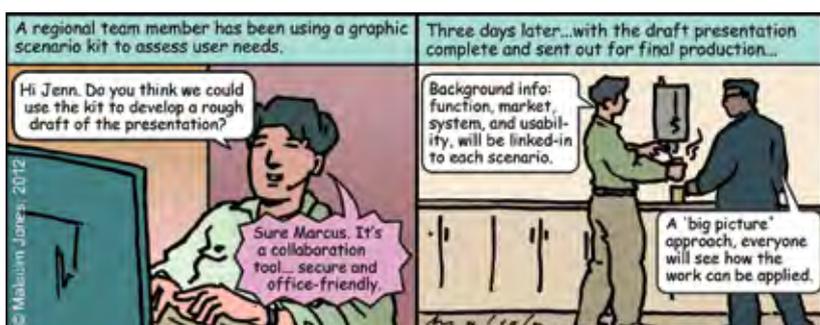


Figure 1 Naturalistic storyboards



Figure 2 Handkerchiefs showing paths



Figure 3 Video showing device use

device use with coloured threads onto an abstract map printed onto a handkerchief (Figure 2). The resulting 'artefacts' are then used as stimuli for experience accounts in interviews. The aim is to enhance the articulation and preservation of experience through *making*.

Presenting experience in this format requires designers to interpret and identify design purposes rather than respond to well-described problems. These material forms of data collection and representation aim at leveraging the interpretative aspects of experience, which can be seen as a valuable aspect in design-centred user research.

Video as a way of representing insights

Using video to communicate insights is a relatively unexplored field in human-centred technology research. Video is more likely to be used for data collection, evaluation or to show fictional scenarios rather than to represent data. In our project on mobile interaction design, video formats were used to communicate use and experience scenarios to designers (Figure 3). The videos were based on interview data and depict details and points of interests (compare Saldaña (2005) on *ethnodrama*). This contrasts with traditional and text-based approaches, where analysis tries to describe phenomena and problems in an exhaustive and generalisable way. They present insights to designers in a condensed but accessible format. This resource helps to evoke design insights, from which design opportunities can be derived.

Conclusions

We challenge the notion of knowledge transfer and propose that prescriptive-type methods can be supplemented by loose

collections of supportive resources. Our projects illustrate how these can support key aspects of design such as framing, guiding, and choice support:

- Resources to get the right story and the story right.
- Recording the language used in relation to touch: expert (and novice) designers
- Creating new materials to collect, store, and represent experience and communicate insights to design.
- Video formats not only provide a means to collect insights, but also to edit and process insights.

Resources are, by their nature, raw. It is for others to take them and shape them to their needs. By changing our focus from *methods* to *resources*, we support a new perspective on user-centred design research. We anticipate that this will enable designers to not just follow prescriptive methods, but to play with resources that support their design practices.

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Interaction Design: Beyond Human–Computer Interaction

As we are all aware, Human–Computer Interaction is a developing field, one in which new technologies and novel application areas present researchers with new problems and HCI educators with fresh challenges to keep the curriculum vibrant and relevant.

A decade or two ago, the challenges for HCI were to provide insights and underpinnings for the design of computing technology in the workplace. One of the principal concerns was to improve the usability of designed software, thereby enhancing the efficiency of the work it supported. Our understanding of key technologies (e.g. desktop computing) and core practices (like usability evaluation) was informed by a seemingly well-established body of theory, to a large extent borrowed from cognitive psychology. Of course these were not the only concerns of HCI researchers and practitioners, but they were certainly high on many peoples' list of priorities.

A changing discipline

In the intervening years, though, the discipline has moved on, with sometimes surprising technological diversity meeting a bewildering array of problems in just about every area of life. The rapid penetration into the market of mobile devices, multi-touch screens, 3D displays and so on, and the focus on domestic arenas as well as workplace solutions, has been met with conceptual advances that emphasise the emotional and social character of users experiences as well as the more functional concerns of usability.

So, against this background, keeping a curriculum up to date, and finding resources to support it, can be a headache for anyone teaching human–computer interaction, interaction design, or

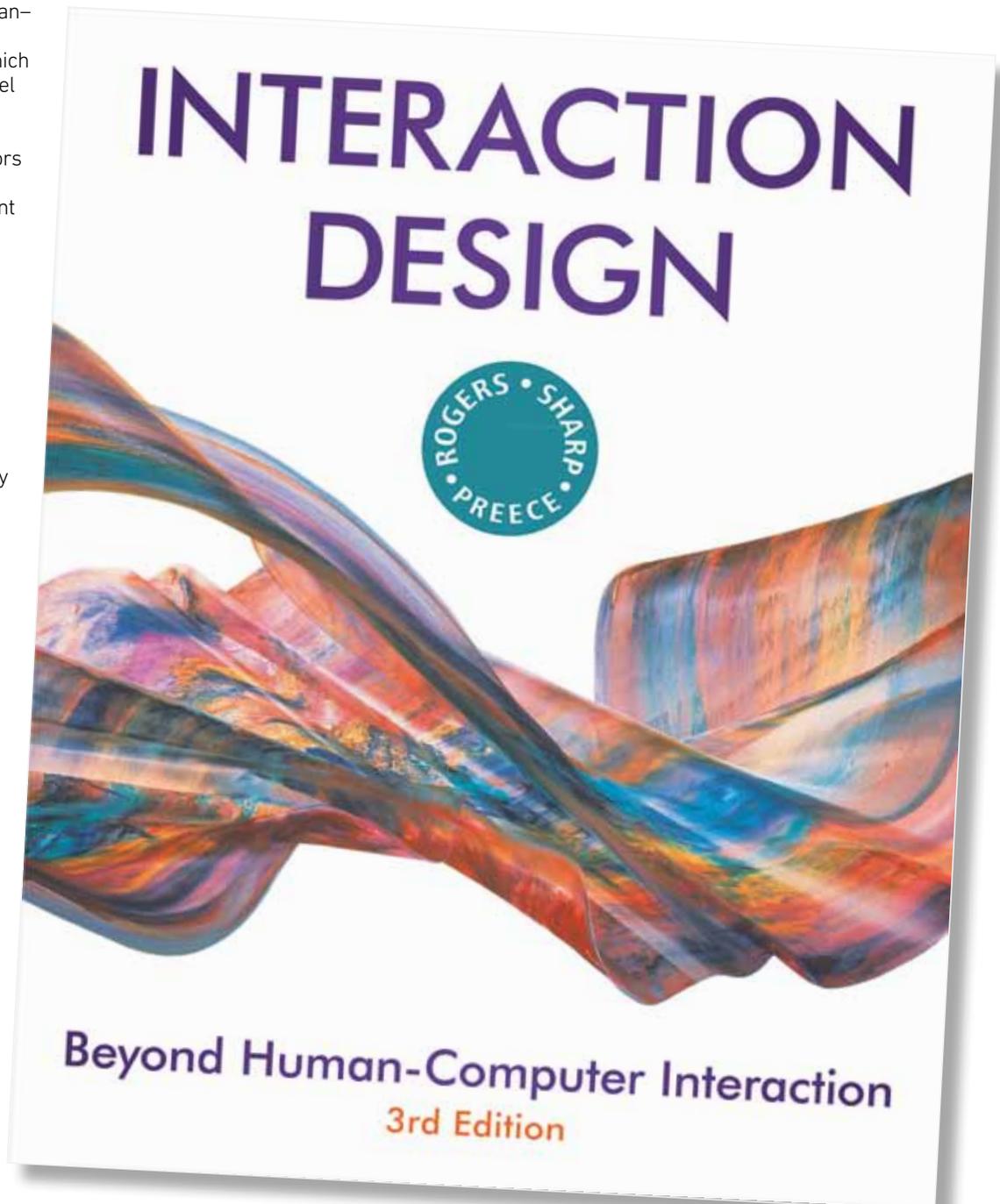
related subjects. Over the last ten years, *Interaction Design: Beyond Human–Computer Interaction* has been a book that has kept pace with changes in the wider field. The new third edition has added new topics, removed ones that nowadays seem less relevant, and given a fresh feel to areas that were covered in the two earlier editions.

For instance, compared to the first edition, the third changes emphasis in a number of ways. The chapter on cognition and psychological theory

covers 'traditional' ground of memory, attention, and so on, but has been updated with many contemporary examples to complement one or two classics from the literature. The coverage has also been extended to include sections on Distributed Cognition and Embodied Interaction, reflecting new generations of cognitive theory emerging in the literature.

Focus shift

A rewritten chapter on Social Interaction



shifts the focus away from a discussion of the mechanisms of and theories explaining communication and collaboration, and towards a consideration of technologies that support sociality.

Again, although much of the content of this chapter has been retained, some repackaging combined with a wealth of new examples, ranging from online social media to experiences like the Reactable, create an up-to-date feel. Conceptual frameworks like the language/action perspective are downplayed in favour of discussion topics like "Dilemma: How much do you reveal to others on Facebook?" I would imagine that such a discussion would be much more likely to engage students than a discussion of the Conversation for Action model, and more likely to generate insights about the nature of social interaction.

A similar makeover has given the chapter on Emotional Interaction a new feel. A whole host of new examples, reflecting, perhaps the body of research and practice in recent years, as well as new topics (persuasive design having emerged in the last few years) and models (such as the 'Four pleasures', 'Technology as experience' models) bring the treatment of emotion in design into a new decade.

Dealing with data

One of the bigger changes is the welcome introduction of new material on data collection and analysis. A dilemma often faced when designing or delivering a course in this area is where and how to

include data gathering – as part of the process of understanding requirements and users, or as part of evaluation. Here the authors have not so much solved the problem as sidestepped it by separating Data Gathering and Data Analysis into two new chapters that are then picked up and referred to in the later chapters on Establishing Requirements and Evaluation. The problem of what to teach first and where to talk about Data Gathering still persists for anyone delivering a course, but however it is done, these two Data chapters provide an insightful and useful resource.

Lively presentation

An area that is perhaps most at risk of looking dated is the material on types of user interface and interaction technologies. The field is developing at a pace, with new products coming onto the scene with ever increasing rapidity. The authors have done a good job of providing an overview in a chapter that presents a 'catalog' of 20 different types of interface. The presentation is kept lively by illustrating 'classics' using examples with a modern twist (like the command-line interface to Second Life), as well as including more recent innovations including Tangible User Interfaces and Brain-Computer Interfaces.

To give an idea of the balance of the book, the angle that it takes, and the emphasis the authors have placed on different elements, the content is roughly organised as follows. Three chapters cover

theoretical perspectives underpinning an understanding of interaction; a single chapter surveys interface types and technologies; and two chapters are devoted to data collection and analysis. The integration of interaction design within the broader development process occupies around three chapters, and the coverage of evaluation occupies the final four chapters of the book.

The book is peppered throughout with carefully chosen examples and illustrations, giving a contemporary air to the whole thing. A number of interviews with well-known figures from the world of HCI and ID research and practice add another dimension and another set of voices. Personally, though, I tend to find interviews with luminaries of the discipline rather less useful than the main text, but presumably many readers get more out of their inclusion.

Versatile resource

I have used this book, in its various editions, as a recommended text for a number of different courses, at undergraduate and postgraduate level. For an introductory HCI course, many will find the treatment deep and comprehensive enough to support an entire module. For a more specialised module, say a final year undergraduate option or a Masters-level module, *Interaction Design* can still be a useful core text, perhaps to be supported by other more specialised materials. For example, one of our courses has an interaction technology focus that is best supported with a range of papers, articles and other sources. *Interaction Design* provides an excellent resource for all those surrounding parts of the discipline – how to collect data, design evaluate, and so on, that students need when they come to research or evaluate their interactive prototypes.

All in all I've found *Interaction Design* to be an excellent all-rounder covering most of the key aspects of HCI and Interaction Design and providing a key resource at all levels of the curriculum. Since the first edition, it has been a very welcome addition to my bookshelf, always close at hand when designing or delivering HCI and ID courses. It can work well as a stand-alone, or could partner well with any of the other excellent books available that take a different slant (Norman, Shneiderman, Cooper to name but a few). Students (and others) have been known to raise eyebrows at the price tag (RRP £42.99). However, many will find this a rewarding purchase for a first course in HCI, doubly so as *Interaction Design* has plenty of depth and breadth to take one through subsequent courses and beyond.

ABOUT OUR REVIEWER

Bob Fields is a Reader in Computer Science at Middlesex University, London, where he is a member of the Interaction Design Centre. Bob has taught HCI and Interaction Design at all levels of the curriculum, recently focusing on tangible user interfaces and physical computing. His research has targeted the design of technology to support collaborative and social activity in a variety of contexts, with a recent focus on understanding and supporting conversations and conversational learning in design.

Please contact me if you want to review a book, or have come across a book that you think should be reviewed, or if you have published a book. I very much look forward to your comments, ideas and contributions. If you would like *Interfaces* to include reviews on a particular theme or domain, then please also let me know. Many thanks.

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THE BOOK

**Interaction Design:
 Beyond Human-Computer
 Interaction**

*Yvonne Rogers, Helen Sharp
 and Jenny Preece*

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LUCY BUYKX: INTERACTIVE RECIPES FOR EVERYDAY COOKING

A home-cooked meal fills the belly and the soul but the prospect of cooking every day can be daunting. Recipes can help. They can inspire cooks to try new ways with familiar ingredients, provide the tools with which to plan meals to a budget and guide cooks through new techniques, giving them opportunities to learn new skills and taste experiences. But recipes bring their own problems to the cooking environment; they can be difficult to follow, or use unfamiliar terminology and elusive or expensive ingredients.

Video systems

Interactive systems proposed by other researchers, for example Personal Chef [5], provide a comprehensive, but simple to follow, plan of action through a recipe. They tap into our love of TV cooking shows with video to illustrate each step of preparation and cooking. The cook may relax and let the system guide her through the instructions, and she can check the state of her ingredients at any time against those shown on the video.

Although attractive and fun to use, systems such as Personal Chef are limited in their scope to help cooks. There are millions of recipes currently available and it would not be feasible to produce customised video support for all of them. Other researchers are exploring ways to reduce the need for customised video. They aim to extract video clips of common

preparation techniques from cooking videos, for example chopping an onion, and then associate them with any recipe text that instructs the cook to chop an onion [2].

But video clips are only part of the solution. Cognitive science shows us that people actively engage with instruction sets. They mentally elaborate the instructions and translate them into an action plan, in this case, thinking about the actions they need to perform on ingredients, what order they will perform them in, how they will be organised on the chopping board and so on [4].

The freedom to plan a course of action creates a space for cooks to 'use the cooking process as a way to express themselves imaginatively' [3, p471]. But there is, at present, very little research describing how cooks engage and interact with recipe instructions, and current designs prioritise 'control [of] the information flow' [5, p3405], which limits the value these systems could offer developing or more experienced cooks.

My research aims to extend the design of interactive recipe systems to support the creative and adaptive needs of cooks actively developing their skills and wishing to put their own mark on dishes.

Learning from grandparents

For my initial research I investigated the meal planning, food shopping and cooking habits of older adults. The existing

food-related HCI research is focused on young novice cooks; I wanted to know if the proposed systems generalised to a wider population. Fifteen older adults aged over 60 years completed a seven-day diary in which they recorded all their meal planning, food shopping and cooking activity. This was followed by a post-diary interview, in most cases at their home.

The findings indicated that these older adults had little need for the meal planning, shopping or cooking support. During post-diary interviews, I learned that many of them were grandparents who enjoyed sharing their cooking knowledge and family recipes with their grandchildren [1]. The cooks described how family recipes can be varied, even evolve, and still retain their identity as a family recipe.

To capture and share these everyday recipes would require a more flexible approach than existing interactive recipe systems. One approach has been to record the entire preparation and cooking of a recipe [7]. Living Cookbook enhanced the social aspects of sharing recipes, but the effectiveness and ease of use of the recipe instructions was not evaluated.

Interacting with recipe instructions

To investigate how cooks mentally elaborate recipe instructions and create action plans, I invited 24 cooks to our Homelab kitchen to prepare three recipes while performing a think aloud protocol. Few evaluations of earlier interactive recipe systems have been presented so this study was designed with recipes presented differently in each of three conditions to enable direct comparative

evaluation. The experimental conditions also made it easy to see what information the cooks sought when, and compare this with the recipe tasks they performed.

In the control condition, instructions were presented as published in their original cookbook, with long paragraphs in most steps. In the edited step-by-step condition, the preparation instructions found in the ingredient list were moved to the recipe instruction list, all the recipe steps were then broken into individual tasks and presented one step at a time, and finally the quantity of each ingredient was inserted into the text of the recipe step. This is a close approximation of the recipe form used in earlier interactive recipe systems. The simple step-by-step condition was an in-between condition where recipe instructions were broken into individual tasks but preparation instructions and ingredient quantities remained in the ingredient list as they were in the control condition.

In both experimental conditions, visual tracking showed that most cooks expressed some form of look ahead behaviour; they looked at instructions ahead of the one that described their current task. From the think aloud transcript I found that in some cases cooks were seeking additional information to help them interpret the current instruction, in others they wanted to see when ingredients were introduced to the recipe

mixture in order to plan their preparation. It was not possible to visually track this behaviour in the control condition but evidence for similar look ahead behaviour came from transcripts of the think aloud protocol and post-cooking feedback.

Representations of instructions

Recipe instructions represent tasks and ingredients in a one-dimensional linear form, one instruction in sequence after another. If a cook wants to find out when the tomatoes are added in order to plan her ingredient preparation she must scan the text to find a mention and then scan again to re-find her place. Other representations of the data in recipes are possible, for example tree or temporal representations, and may enable more effective information seeking [6].



Other researchers have used these forms to improve recipe search results but have not evaluated their use in cooking situations [8].

Future research

I am developing a prototype interactive recipe system using tree and temporal representational forms of the instructions, which will enable cooks to quickly grasp an overview of a recipe and to zoom into details as required. The prototype will be evaluated and the findings compared to the earlier study. To explore what it means to be flexible in preparing an everyday recipe, I have invited cooks from the earlier older adult study to come into the Homelab kitchen and prepare everyday family recipes.

Lucy Buykx is a 3rd year PhD student in the Department of Computer Science at University of York under the supervision of Helen Petrie, Professor of Human Computer Interaction. She completed a BSc in Psychology with the Open University while working full-time as a programmer, then combined the love of technology and psychology with the MSc in Human-Centred Interactive Technologies at University of York. Her research is funded by the White Rose University Consortium www.whiterose.ac.uk

MY PHD

If you are a PhD student just itching to tell the world about your research or if you've enjoyed reading about some of the emerging areas of research that the My PhD column has recently discussed then we would like to hear from you.

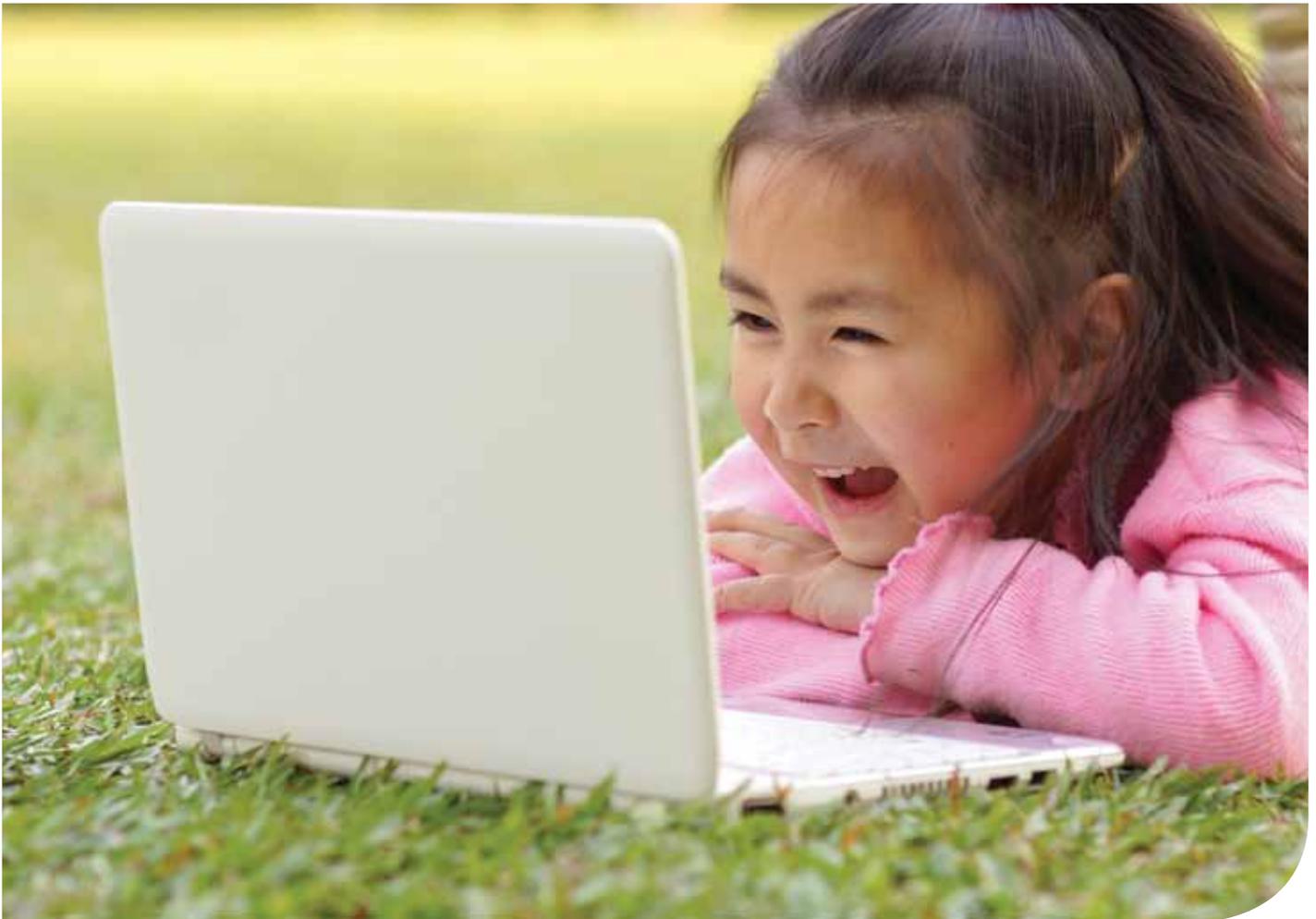
We are currently accepting one to two page summaries from PhD students in the UK and across Europe with a focus on being open and accessible to everyone in the HCI community. If you would like to submit or would just like more information please contact Professor Shaun Lawson using the contact information below.

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DESIRE AND DISASTER

Alan Dix, Talis and University of Birmingham, suggests that focusing effort and creativity on 'peak experience' can help to inform and guide practical design decisions.

Recently, when thinking about practical design decisions, two words keep flowing through my head: *desire* and *disaster*.

Disaster

What are the things that make a product or application a non-starter? This is not about usability friction, all those interface gripes (which I keep getting annoyed at in other people's products); we can live with a lot of pain so long as we get things done. Indeed I keep using Word, Dreamweaver, and this RSI-inducing Mac, even though I constantly complain about them all.

No, the things that are critical are those which make us think, "Enter my address book into yet another application...? NO WAY!". Total disaster is typically about failures of functionality, not usability 'problems', unless they are so severe that we cannot do what we want to do at all.

Desire

What makes your eyes light up when you see or think of a new product or service? You may use a product because you are told to as part of your job, or because you

have to because it is the only way to do something, like book an airline ticket – but what makes you adopt something for the first time when you have free choice?

It is clearly neither good usability nor good engineering that has made Apple successful, but desire. This is not simply user experience, which is often incremental, though it may be about beautiful aesthetics; however, it is again more likely to be about core functionality that really makes a difference to some small area of our lives.

Priorities for design

There are things we can do to improve a product where for each unit of effort we put in, the product gets a little better. These are important, and they are what most usability testing helps us do. However, it is at the points of inflexion where small amounts of improvement make an enormous difference, either rescuing a product from disaster or enriching it with desire.

If you are creating a new product and find yourself 'fixing' usability problems,

you have probably already lost. Instead it is in design techniques for 'peak experience' (Dix, 2010), utter sorrow or utter joy, where success belongs; this may break with normal usability processes, maybe focusing on a single user and only later generalising. When a product is established, we can worry about the little things, but for a new product it is at these extreme points, disaster and desire, where we must focus our effort and creativity. And, between the two, perhaps most important of all, is desire.

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