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## 05 ENTERPRISE USABILITY ARCHITECTURE

Outlining the need to address organisation-wide usability issues, particularly for staff-facing systems.

## 10 PERSONAL COMMUNICATION

Exploring the value of reintroducing personalisation into our digital communication.





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### Submission guidelines

Articles should be MS Word or plain text. Send images as separate files: these must be high resolution digital originals suitable for commercial printing, cropped if desired but not resized, and if edited, saved as tiff or highest quality jpeg. Please supply photographers' credits as appropriate. Authors should please provide a 70-word biography and a high resolution head and shoulders original digital photo.

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This issue includes a wide range of articles – which in a very small way starts to show the diversity of HCI. Articles range from the business world, with a call for more focus on usability at the enterprise level, to our personal lives with an exploration of the role of personalisation to bring the 'personal' back into digital communication. A number of articles have included reference to Second Life – from creating a safe environment to learn and practise cultural competencies, its role in e-commerce, to simply finding your way around 3D learning spaces. 'My PhD' investigates the psychology of the programmer – something I personally have not explored since my own PhD twenty years ago.

Looking at the Spring issue of ten years ago I notice the same plea as I am about to make. Nothing is achieved without resources. I appeal to you the resources, as writers, innovators and thought-leaders in the domain of HCI, to evolve from lurkers to contributors. I am keen to hear your thoughts on the magazine: would you like it to transform? Do you have a need that it could address? Most of all I would love to receive your contributions.

This issue I would like to welcome David England as the newly appointed Chair of the BCS Interaction Group and thank Fiona Dix, our production editor, for her endless patience as I struggle to find contributors.

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## FUTURE FOCUS

**Dave England**, the new Chair of Interaction, reflects on the pitfalls and advantages of maturity, and asks how we in the HCI community can face the challenge of maintaining our own work while remaining open to the ideas of other domains.

### Three decades

Both HCI and I have reached our third decade of professional practice. And as Tom observed in his last *View from the*

*Chair*, we are demonstrating the pitfalls of middle age, in terms of spreading, but also some of the advantages, of being able to reflect on our history and focus on what

needs to be done next. Our most focused activity has been the conference, which has seen increased competition with the spread of ideas into mobile, ubiquitous and social computing, software engineering, etc., each spawning their own conferences and symposia.

### New ideas

However, with academic HCI new ideas are coming forward from Digital Arts and Humanities that challenge some of the practices we were engaged in 20 to 30 years ago. My own path has mirrored these developments, starting as a software engineering researcher at the University of Lancaster in the 1980s; then, in the 1990s, as a post-doc in Glasgow, working with psychologists and being introduced to CSCW in Germany; and then, in the last decade, working with artists and being more concerned with the experience rather than with usability.

### Open dialogue


The main constant in HCI is that it remains interdisciplinary, and one of our focuses in the future must be to maintain this openness of dialogue. However, it is a 'focus' that is hard to maintain, given that each shiny new idea has the potential to distract us – and generate a new series of conferences. So there is the challenge, how do we maintain our own work whilst being open to the ideas of others?

There are many domains in which we can face this challenge. For me, more recently, it has been in Digital Art. Starting with Tunde Cockshott's Wet+Sticky paint program, the challenge of how to make it interactive progressed to the challenge of reasoning about interaction with a concurrent system. And with each subsequent Digital Art/HCI collaboration new lessons were learnt and new research questions raised about what it means to interact, and how viable is it to measure what we are doing? This has led more recently to the first ACM SIGCHI Conference Community in Digital Art for CHI 2012.

### Taking the lead

Of course British HCI did it first with Queen Mary's evening of Digital Entertainment at HCI 2006 followed by the Digital Live Art event at HCI 2008 in Liverpool. Perhaps rather than following other conferences we should see ourselves as being more open and more experimental and taking the lead; sometimes in the hope that others will follow, but more importantly because we believe our ideas and the challenges we pose will benefit ourselves, our research community, our industrial partners, and the wider public.

# ENTERPRISE USABILITY ARCHITECTURE



**Edward McDaid, Tata Consultancy Services, and Sarah McDaid, London South Bank University, explore the need for an enterprise-level view of usability, for which new or enhanced models and frameworks will be required.**

## **Usability in the enterprise**

The importance of usability and a user-centred design approach as primary factors in determining the effectiveness of information systems and also in contributing to the success or failure of IT initiatives has been acknowledged in some circles for a long time. This correlation should not be that surprising. Solutions that adequately consider the context, requirements and structure of a business function in conjunction with the user needs should be more likely to prove successful than those that pay scant regard to such considerations.

There is also an aspect of ownership and stakeholder engagement. In general, systems that are developed through a process of consultation are more likely to be accepted by users and stakeholders, particularly if this involvement occurs early and often throughout the process. Similar observations concerning the importance of requirements and stakeholder engagement have also been made in other disciplines such as enterprise architecture, for example.

## **Challenge and change**

Enterprises must change to meet new challenges if they are to thrive or even if only to keep up with the competition. Business change is a common driver for large scale IT rationalisation, consolidation or modernisation and such change is also frequently associated with wholesale changes in the user experience. Systems that have been in use – sometimes for decades – must be replaced, re-engineered, integrated or sometimes just given a facelift. Changes in the user interface are certainly an important opportunity for improvement but they can also represent a significant risk. Understanding and communicating the scope and impact of change are among the key elements in mitigating this risk.

Standardisation and integration are recognised as important heuristics for architecting an efficient and effective business. These are the dimensions that are commonly used in describing business operating models. Enterprises often have a large menagerie of off-the-shelf and bespoke information systems that

reflect the various eras in the historical development of user interface paradigms and technologies.

Some of these systems may be integrated to a greater or lesser extent but often they vary considerably in terms of their user interfaces. Particular usability issues in a specific system may be readily apparent but the business impact of poor usability can also cut across multiple disparate systems that are required to support a single business function. Given that a large enterprise may utilise hundreds or even thousands of different information systems, there is a need to be able to take a more holistic view.

Some enterprises are attempting to tackle organisation-wide usability issues through a combination of HCI standards definition and common user interface technology platforms, such as portals. Initiatives like these may help to some extent, but whatever the approach there is a need to be able to articulate and reason about user experience related problems, options, priorities, impact and roadmaps at an enterprise level. These are not currently



common ways in which to think of or talk about usability.

### **Enterprise usability needs**

The last two decades have seen many changes including the widespread adoption of the web, e-commerce and mobile devices. As a result, in recent years much of the focus on the user experience in an enterprise context has been on that of the customer. Usability within and across the enterprise is also important; however, there are some differences in focus regarding user experience priorities for internally facing business systems. There are also significant differences in terms of what is interesting with respect to usability at a systems or micro-level as opposed to an enterprise or macro-level.

### **Business applications**

Internal business applications, in general, are likely to be more utilitarian and have less emphasis on graphic design than is the case with customer facing interfaces. Some aspects of use such as productivity and throughput can be more important considerations for business applications and even with modern GUI or web-based interfaces some business users still rely heavily on the keyboard and on keystroke shortcuts.

Business systems can also be very complex with hundreds or even thousands of user interface screens and sometimes with over a hundred data entry components on a single display. In an enterprise environment applications frequently implement or form part of complex business processes

and workflows. These networks of interdependent systems may be completely or partly integrated, rely on manual tasks or even in some cases on re-keying of the same data.

In some other respects usability within the enterprise is no different to that in other contexts. Large enterprises often have a sizeable and diverse user base. As a result it is important to consider accessibility in a workplace context including common problems such as visual impairment and colour blindness. Many of the various usability guidelines that have been formulated over the years apply equally to internal business systems although some are less relevant.

### **Improving awareness**

In general, the level of awareness of user experience considerations in the enterprise is improving – at least at the micro-level. Some enterprises are already fairly well positioned with respect to modern usability best practice while others still have some way to go. For example, many executives have a reasonable understanding of concepts such as usability guidelines and usability testing. However there are some (unfortunately prevalent) perceptions that usability is a sub-discipline of graphic design or even of market research.

Some enterprises have been using elements of user-centred design, including prototyping, for some considerable time. Rapid Application Development which has been fairly common since the 1980s has similarities to more modern agile methods. Likewise, wireframes have been around in some organisations for a long time and in

various forms but their popularity together with related artefacts such as storyboards has increased significantly in recent years.

HCI standards definition and governance is one area where usability can currently be an enterprise-level consideration. This is not always the case, though, and the application of such standards can be patchy, with islands of conformance that are frequently demarcated along organisational boundaries. Other aspects of usability that may be considerations at an enterprise level include technology standards and (marginally) some elements of business process modelling. For the most part, though, the user experience does not currently get sufficient attention at an enterprise level. Given the implicit business importance of usability this is not an ideal situation.

### **Enterprise and business architecture**

At a strategic level, the disciplines of enterprise and business architecture exist in order to help to optimise the alignment between the business and IT. Enterprise architecture (EA) involves comprehensive modelling of the business and IT to develop viewpoints that support the definition of strategy. Typically this involves the creation of as-is and to-be models together with various intermediate transition states. Enterprise architecture also includes architectural governance based on explicit principles as well as a focus on requirements and stakeholder management.

### **Breadth of view**

A frequently used real-world analogy is that EA corresponds to city planning as opposed to regular architecture which relates to a single building. In EA it is common to produce simple yet comprehensive diagrams that describe particular aspects of the business or technology such as the complete application landscape for the enterprise. These simple, enterprise-wide views are used to aid communication between the business and IT, and they are often augmented with overlays to help visualise a particular aspect such as the scope or impact of a programme.

Business architecture is a part of EA that is focused on simple business modelling at an enterprise level. It can be and increasingly is practised as a separate discipline although most often business architecture is a pre-cursor to full blown EA. Business architecture focuses on modelling the functional components of the business, conceptual business information and the key business flows or value streams. Business flows provide a simpler, more flexible and less constrained way in which to talk about the dynamics of



the enterprise than do other more detailed representations such as business process models.

At the most fundamental level enterprise architecture provides a common language for the business and IT. It also serves to stimulate the right conversations between business and technical people.

### Frameworks

Many frameworks, tools and techniques are available to support these kinds of initiatives, such as the Open Group Architectural Framework (TOGAF), for example. While some of these frameworks identify usability as an element it is often treated as a relatively minor consideration. (This is not helped by the fact that both usability and enterprise architecture use the term 'information architecture' to describe two different concepts.) In general enterprise architecture frameworks still have some way to go in terms of having an adequate degree of emphasis on usability.

### Enterprise user experience architecture

Largely speaking, usability and enterprise architecture normally operate at different levels within the enterprise. Enterprise architecture is firmly embedded in the strategic level and where it is applied it tends to get serious attention from CXO level executives. For a variety of reasons usability is generally a tactical consideration which is most often relevant in the context of individual projects or programmes. This does not have to be the case.

### Adapting existing models

Existing enterprise and business architecture models can be adapted and used as the basis for developing a wide range of enterprise-level usability viewpoints. For example, overlays on a business component model can be used to show the level of user experience standardisation, the prevalence or characterisation of usability problems and the frequency of use of various interfaces across the entire enterprise.

Similarly, business flow models can be adapted to show process and integration related usability issues – again at an enterprise level and not just in terms of individual systems. Viewpoints can also be prepared that include individual systems using application landscape diagrams as a starting point. These can be refined in various ways such as classification based on meta-data.

Enterprise-wide usability perspectives can have many uses in their own right. Additional insight can be gained by combining these with other information such as value, cost, project estimates,

## Usability and the user experience need to receive more attention at the strategic level within the enterprise.

dependencies and timelines to name a few. This augmentation can help to support more business focused decision making around strategic usability options and opportunities. Conventional enterprise architecture models are frequently used as the basis for gap and impact analysis as well as for the identification of opportunities and risks. Enterprise-level usability perspectives can help to apply these strategic ways of thinking to the enterprise user experience.

Standard enterprise and business architecture models provide a wide range of viewpoints that can be applied to usability at an enterprise level. It is also possible to define any number of more usability specific perspectives. Many of the modelling tools that are available to support enterprise architecture can be customised to accommodate such viewpoints.

### Overlap

Enterprise-level models of usability also have a degree of overlap with business operating models. A business operating model can be thought of as a specific configuration of the enterprise. This is frequently expressed as the level of standardisation and integration of the enterprise for various dimensions including customers, channels, products, services, suppliers, functions and data – amongst many others. Some of the dimensions used in operating models are also relevant in usability. Consequently operating models also have the potential to act as an input into or basis for more business focused enterprise-wide usability models.

### Looking forward

Existing enterprise architecture models can be used to develop enterprise-wide viewpoints of usability considerations and these can already serve as a useful basis for strategic thinking and planning around usability and the user experience. However, HCI has a different and broader scope than EA. As a result new or enhanced models and frameworks will be required in order to fully realise the potential of taking an enterprise-level view of usability. One obvious improvement would be to integrate EA models with those from HCI to better reflect elements of usability.

User experience in its broadest sense is about communication and increasingly this includes communication with

other people as well as with machines. Similarly, enterprises themselves are social groups and various forms of value creation within an enterprise are joint activities with their own social dynamics. In the past enterprises have traditionally taken an individualistic view of internal business activity. Until recently they have also applied similar ways of thinking to customers. The realisation that social considerations are also important has changed this and as a result enterprises must now consider the social dimension to functions such as customer relationship management.

### Social considerations

Enterprises must come to terms with social considerations, and their dynamics and behaviour, in addition to that of individuals. This is something that current EA and business operating models are not particularly well equipped to do. The same can also be said of most classical HCI models which were developed in an era that was fixated on task analysis and a single application.

However, recent social models of HCI have started to address this gap. The Model of Interaction in a Social Context (MISC) integrates classical HCI models together with models of social communication from social psychology and sociology. As a result, MISC includes a comprehensive set of communication and interaction model elements including goals, roles, relationships, norms, personality and cognition. Modern HCI models such as MISC have the potential to provide a foundation for new types of enterprise models that can help to represent a broader range of user experience considerations including social perspectives.

Usability and the user experience need to receive more attention at the strategic level within the enterprise. In order to achieve this they need to provide an enterprise-wide view of usability considerations. Enterprise and business architecture methods and models can be applied and tailored to achieve some of this. The rest will come from the integration of EA methods with those from HCI. Social models of HCI fill a gap that exists in both disciplines and have the potential to provide better enterprise models of usability as well as more socially contextualised view of the enterprise itself.



# VIRTUAL CULTURE

**Mohammad Obaid** of the University of Canterbury, New Zealand, and **Birgit Endrass** of Augsburg University, Germany, collaborate on an interface metaphor that offers promise for teaching cultural competencies and avoiding culture-related misunderstandings.

## Introduction

The Human Centered Multimedia Laboratory (HCM Lab) at Augsburg University, Germany, and the Human Interface Technology Laboratory New Zealand (HITLab NZ) at the University of Canterbury, New Zealand, have recently been working together towards a new interactive metaphor that can simulate cultural behaviours through virtual agents.

Living in a multi-cultural world, teaching cultural awareness and, in particular, learning about culture-related differences in behaviour has become a crucial task. Spatial behaviour, for example, is culture-specific. Pease [1] describes several situations that lead to misunderstandings between members of different cultures due to different perceptions of spatial behaviour. In one example, he reports on a conference in the US, where a Japanese attendee talked to an American participant:

... the two slowly began to move around the room, the American moving backward away from the Japanese and the Japanese gradually moving towards the American. This was an attempt by

both the American and the Japanese to adjust to a culturally comfortable distance from each other. ... Video recordings of this phenomenon replayed at high speed give the impression that both men are dancing around the conference room with the Japanese leading ...

This example shows that different cultures have a different perception of what an appropriate interpersonal distance can be. Not surprisingly, the American conference attendee, from the example given above, might have perceived the Japanese participant as being pushy or over-familiar while the American might be thought to be cold or reserved.

Misunderstandings can arise since cultural background not only influences one's own behaviour but also affects one's perception of someone else's behaviour. Possible culture-related misunderstandings are sometimes not even recognised as such. If communication partners take a common basis of social knowledge for granted, they may interpret each other's behaviours in their own culture-specific way. Assuming that this

interpretation is correct, they may decode behaviours wrongly. Even worse than being overlooked, the interlocutor might assume that the behavioural misconduct was done on purpose. In this way, people might be confronted with being refused without knowing the reason for it, which in turn can lead to frustration.

For well paid managers, life role playing with actors who act out different cultures is often used to teach cultural awareness. However, hiring actors can be very expensive. This has inspired us to look at a new interactive metaphor that can simulate cultural behaviours through virtual agents.

Agents supported with social and cultural behaviours can help to educate users in some of the important cultural aspects that are necessary in the new environment they are about to experience. Our intention is to give the user a chance to interact and experience the new culture before being put into it in reality.

## Virtual characters in a Beergarden

Virtual characters are an emerging interface metaphor among the HCI



research community. Empowering a virtual character interface with social and behavioural capabilities can simulate, as far as possible, the seamless natural interaction between the user and the computer. Reeves and Nass [2] highlighted the importance of social channels in using computers, as they allow the users to respond socially and consider the computer as a social element.

### Embodiment

Through their embodiment, virtual characters are able to express verbal and nonverbal behaviour in a natural manner and thus offer great promise for teaching cultural competencies. Besides saving training costs, using virtual agents instead of human training partners has several advantages. First, with a virtual agent as a communication partner, the task can be repeated as often as liked, without the risk of annoying a human training partner or paying for each additional lesson.

Another advantage is that an emotional distance is kept. On the one hand, the trainee might feel embarrassed by training behaviour routines with a real human and on the other hand, he or she does not need to be afraid of embarrassing the virtual agent by treating it in a culturally inappropriate way.

In addition, cultural differences in behaviour are often very subtle, and thus hard to recognise. Using virtual agents, these differences can be acted out in an exaggerated manner or can be shown in isolation. In contrast to real humans, virtual agents can change their culture. In that way, one and the same agent can simulate the behaviours of different cultures and point out the differences.

Using the Virtual Beergarden application, Birgit Endrass and colleagues at the HCM Lab have already exemplified the simulation of cultural differences for the German and Japanese cultures. Besides differences in the characters' appearances, their choice of topics to discuss and their ways of managing communication, as well as their usage of body postures and gestures, vary with their cultural background.

### Virtual characters in Augmented Reality

Augmented Reality (AR) is a technology that involves the seamless overlay of virtual images on the real world. It has many possible applications in a wide variety of fields including entertainment, education, and medicine. The HITLab NZ has been involved with AR research for almost 10 years and is one of the largest AR research groups in the world.

More recently, Dr Mohammad Obaid and colleagues at the HITLab NZ have explored the use of Augmented Reality Virtual



Agents to understand the user's interactive experience. Previously, research on virtual character interfaces has tended to focus on the user's behaviour in desktop and virtual environments. Only a few studies explore the use of virtual characters in AR environments. Interacting with virtual characters in AR environments may provide a more immersive user experience than traditional virtual character interfaces.

The HCM Lab and the HITLab NZ are bringing together their expertise to simulate cultural behaviours through virtual agents in an AR environment to

provide the user with a more immersive and natural experience.

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# PERSONAL COMMUNICATION

**Daniel Gooch, the University of Bath, argues for the personalisation of computer-mediated communication technologies, bringing traces of the other person into digital exchanges.**

There is a genuine concern amongst many people that the digitisation of much of our communication is making us less sociable: see, for example, Shah et al. [7]. Whatever your stance on the issue – I personally believe it to be incorrect and that the internet has greatly increased communication opportunities – there is a disturbing precedent being set. Computer-mediated Communication (CMC) in general seems to have been built around what is easy for engineers to make, not what is best for those who are communicating.

As a field, we have moved beyond questions of efficiency and usability towards questions of engagement and intimacy. Through the rest of this article, I'm going to try and convince you that the

next best thing for CMC (not necessarily the next *big* thing) is the reintroduction of personalisation into communication.

## **Traces of personality**

By personalisation, I am not talking about the ability to change font type or text colour. I am talking about communication which includes a trace of the other person, be that their voice, their handwriting or any other characteristic which brings the other person to mind.

These traces are clear in traditional communication media – voice on phones; voice and seeing faces when talking face-to-face; handwriting in letters. Looking at current commercial CMC systems, the only mainstream product on the market

which uses these traces (and uses them well) is Skype – especially its video chat functionality. It is such a compelling experience that after using it with my parents whilst working in the USA for three months, they now refuse to chat on the phone, instead rushing off to turn the laptop on so we can Skype.

## **Text based CMC?**

A quick look across other popular offerings – emails, SMS, Facebook and Twitter – tells us that these systems are all predominantly text based. And 'text based' in the CMC world has come to mean the same as typed text, with no one stopping to consider whether that's really the best way to connect with people. Let



Now there are naysayers who would say that such systems have been tried before and failed. My response to that? The Apple Newton is widely labelled as having been a failure... but it introduced the entire concept of hand-held devices with pen recognition – a significant advance in I/O technology. Likewise videophones were a disaster but Skype has shown a real desire for video conferencing. Just because a particular system fails, it doesn't mean that the underlying ideas are worthless.

### Sharing media

There are existing systems which use the online realm to encourage the sharing of traditional media. Postcrossing, [www.postcrossing.com](http://www.postcrossing.com), is one of the most popular of these, giving people the opportunity to swap postcards with other like-minded people. One of the things that people like about using the Postcrossing service is that the postcards they exchange are personal in nature [6].

In the research world, efforts have been made to develop CMC technologies focused on intimacy. These include augmented beds [1], software awareness systems [5] and tangible systems [8]. These systems have focused more on communicating intimacy and awareness than personalisation *per se*.

### The Magic Sock Drawer

Along with Leon Watts, I have been working on developing CMC technologies which specifically integrate personalisation

into them. The Magic Sock Drawer [2] was developed as a system for allowing long-distance couples to leave hand-drawn but digitised love notes for one another. A field trial of the system indicated that the personalisation aspect of the notes was liked by the users of the system. Additional evidence came from a three-week diary study looking at personal relationships (both co-located and long distance) and the communication technologies those people used [3] where people often mentioned personalisation as being a significant factor for using particular technologies.

Our work has resulted in the creation of a design space highlighting those factors which we feel are important but that have been overlooked in the development of CMC systems [4]. Personalisation is one of the key factors within that design space.

### Delight

There remains a real desire to communicate with people in intimate and personal ways. The joy a handwritten letter brings is still a delight to behold. I think we have an obligation to ensure that the technologies for which we are responsible are tuned to create those same feelings of joy. The image of aged letters preciously stored for years is seared into our collective consciousness. I struggle to believe that anyone can envisage the same scene with any digital technologies as they are currently set up. I hope I've now convinced you that we should all be aiming to reintroduce the personal back into CMC.

There remains a real desire to communicate with people in intimate and personal ways. The joy a handwritten letter brings is still a delight to behold.

us take emails as an example. When the idea of electronic mail was first conceived, the exchange of bits and reformatting them into the correct typed characters on a different networked machine was challenge enough. Now, though, I ask whether this is enough.

There is no fundamental reason why emails have to appear as typed text. I can easily envisage a situation where a person types an email; their computer has a sample of their handwriting which the email system uses to reformat the typed text into handwritten text. The system would keep all of the benefits of email as it currently stands – speed of transmission, cost, convenience, the ability to touch anyone anywhere in the world as easily as the guy down the street. Email has a lot going for it – why can't personalisation be added to that list?

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# TEA AND TECHNOLOGY

**Lynne Coventry and Emma Jones, of the Psychology and Communication Technology (PaCT) Lab, Northumbria University, explore the role of Tea Parties in creating a fun and supportive environment to understand the role of technology in the lives of older adults and their attitudes towards new concepts.**

The older user is a growing demographic who are seeking to use technology as part of their everyday lives and to extend their ability to live independently. The idea that technology can enhance the lives of older adults is well established in the HCI and gerontechnology literature. In the last decade substantial research and development money has been invested in developing technology to meet the needs of older adults. Marketers have long

recognised the power of the 'grey pound' (Barrett and Kirk, 2000) – some older adults have money to spend and could potentially invest in technology. Yet much of the technology developed specifically for older adults has failed to be widely adopted. This group will only invest in technology if they can perceive a return on their investment – i.e. what is the value proposition. As a result of a cost-benefit analysis, which is not just about the

financial cost, they will decide whether or not to buy and use a specific technology. For example, over half of 75–79 year olds own a mobile phone but they often only use a small number of available features. The fundamental question is why this situation persists despite the utilisation of user-centred design techniques such as participatory design. There are difficulties using traditional HCI techniques with this group. We have explored the utility of





requirements for a solution and identifying issues that will affect acceptance of the technology before committing to a design direction.

#### Difficulties eliciting requirements

A great deal of HCI work concentrates on the inclusion of older adults in the digital revolution. This may be either by developing new technologies or by examining usability issues with current technologies. Researchers have long recognised the importance of involving older adults throughout the design process, but this creates challenges including how to elicit requirements for products which do not exist yet. Researchers from the University of Dundee have coined the phrase *user sensitive inclusive design*, acknowledging that traditional HCI methods are not always appropriate for older users (Newell and Gregor, 2000). Problems include finding it difficult to keep a group of older adults focused on the topic, eliciting honest opinions, and a tendency for older users to blame themselves for inability to use technology, rather than recognising design issues.

#### Technology Tea Parties

Tea Parties are based on a qualitative approach, utilising technology probes, questionnaires to allow individual thoughts to be expressed, and discussions within the group setting. This method is particularly suited to studying attitudes towards and behaviour with current technology. It also provides a supportive environment to start to discuss the perceived value of more futuristic scenarios.

We have used lessons learned from other researchers to inform the development of our Technology Tea Parties. Based on this we:

- clearly explain the purpose and role of participants,
- avoid jargon,
- enable participants to be interactive and hands-on (when appropriate), and
- encourage social interaction.

We ask participants to bring examples of their own technology where appropriate, e.g. their own mobile phones or even an example of something they find difficult to open. We also provide our own examples (technology probes). These may take the form of released products, physical prototypes or sketches of possible designs.

#### Supportive environment

For each Tea Party we invite a small number of older adults to the university to

participate in a group discussion. We have an excellent relationship with our current participants that has been maintained for 28 years (participants have been involved in North East Age Research, a longitudinal study of cognitive function and ageing in North East England, UK). We create an informal, supportive environment where participants can have hands-on experience of technology with discussion over tea and cake.

Participants are initially recruited over the phone. Following the telephone call, information about the date and time of the session and clear instructions on how to get to the venue are sent via post. They then receive a courtesy call to remind them of the date and time of the session and answer any questions they may have.

The discussions and interactions are video recorded. The audio is analysed using thematic analysis. The studies are approved by our Ethics Committee.

We recognise the diversity represented within this demographic and believe that Tea Party guests should be demographically similar to each other; else the diversity of views may dissuade people from contributing to the discussion. To date, we have concentrated on a subsample of cognitively intact people, living independently at home. They are aged from 70 years and include representation of the old-old (over 75 years). We have classified all participants as 'successfully ageing'.

#### Example: Games console and exercise

Exercise has been shown to be a key health behaviour associated with increased longevity. However, of those over the age of 75 years, less than 10% manage to achieve the Department of Health recommendation of at least 2.5 hours of moderate aerobic activity per week (e.g. a brisk walk, ballroom dancing or mowing the lawn) in addition to muscle-strengthening exercises on two days (e.g. tai chi, dancing, yoga).

The potential of games consoles to assist older adults in increasing their levels of physical activity was explored in this Tea Party. The games console could be particularly beneficial for older adults as a large variety of activities are available including tai chi, bowling and table tennis, which are performed using appropriate body movements, rather than by the use of controllers. In addition, it can be used in a person's own home or a more social setting. This study was exploratory and examined levels of physical activity and attitudes towards the technology in a group of older participants. We were interested in finding out if older adults were open to the use of games consoles to

creating a social setting to elicit opinions and examine the user-experience of older adults. Our 'Technology Tea Parties' have been developed using principles reported by experts in the field and are unique in the way they flexibly combine a number of HCI methods to engage older adults with technology. We have run some pilot studies looking at mobile phones, games consoles and iPads with older adults, and found that the supportive environment enables participants to discuss their thoughts and feelings openly.

We believe that involvement with potential users should occur prior to design activities – that if an older adult is put in a situation where they are being asked to design, they may not necessarily voice thoughts about the acceptability of the idea. We propose that more focus is required on identifying user needs, eliciting



increase physical activity.

Our Tea Party highlighted that this particular group were physically active and liked to get out and about and thus rejected the idea of using the games console as they felt they would have to give something up to make time for it. However, they did recognise that personal circumstances could change and they would use this temporarily if they could not get out as a result of caring for someone else, recuperating from an illness or operation, or due to bad weather. Participants felt that the games consoles would be beneficial in day centres or residential homes and could encourage exercise through some friendly competition. However, they raised the issue of cost and technical support being potential barriers to use.

### General discussion

The Tea Party environment facilitates open discussion of different types of technology. The participants are happy to explore where and when different technologies are appropriate for use by their generation – and even highlight annoying behaviour from other generations using the same technologies!

### Research can be fun

Overall we have found that older people enjoy engaging with both the research process and new technologies. Our work shows that older adults are:

- interested in new technologies,
- keen to use new technologies, if they can see a benefit to themselves,
- able to use these technologies, and
- able to envisage times and places where these technologies could be beneficial.

Moreover, they are keen to point out problems with the technology or ways in which they feel it would not be appropriate for their lifestyles. Because we have built up a partnership with these participants over many years, they are not afraid to express their opinions and are aware that negative opinions are as beneficial to our research as positive ones.

### Mutual benefits exist

Tea Parties have been found to be mutually beneficial for researchers and participants. Following each Tea Party, participants have always expressed enjoyment and willingness to come back. Participants enjoy making a contribution to our research, and we always communicate the importance of this contribution both at the time and later via newsletter updates. Moreover, we endeavour to create an informal, non-threatening atmosphere at each Tea Party and encourage social interaction. Participants value the social aspect of Tea Parties, where they can chat to the researchers and one another.

The provision of refreshments aids social interaction and is an important part of the whole experience. Often, participants

will have informal discussions over refreshments which can reassure them in discussions about the technology. Social discussions often turn to the technology spontaneously. For the researchers, Tea Parties are also enjoyable, and in addition they provide rich, detailed data that can be used to inform future work. This method is particularly useful during initial, exploratory phases of the design process.

### It's not about the money

Although participants have been provided with £10 towards travel expenses, this is not the reason for participation. Many have said that they attend in order to make a difference and do not require monetary compensation. Previous researchers have suggested that financial incentives may not always be effective for older adults (Barrett and Kirk, 2000). However, others argue that for older adults some compensation may be necessary (Ellis and Cochran, 1999). We have found that it's not necessary, but it's an added bonus for them. Payment is especially helpful for participants who are unable to take public transport, and ensures that the cost of transportation is not a barrier to participation.

We did not experience significant problems running Tea Parties with older participants. This may be because the participants are all high functioning and they feel their contribution is worthwhile, but may also result from them enjoying the informal and interactive format of the



Tea Parties. Participants all engaged with the topics, remained focused and raised some interesting issues.

### Necessary but not in isolation

By adopting Tea Party methodology as part of a pluralist approach, we have been able to identify further barriers to the uptake of technology which have not been raised directly by the participants. For example, the participants in the physical activity Tea Party did not feel that they required any supplementation to their current levels of exercise. However, a mobility study using accelerometry to objectively quantify levels of activity (of which these participants were a small sample) revealed that even these active older adults have low levels of activity and high levels of sedentary behaviour (Lord et al., 2011). The discrepancy between participants' beliefs and their behaviour creates a problem for marketing potentially assistive technologies to this group, and is something designers and marketers need to consider.

### Conclusions and future work

Tea Parties are a potential tool in the battery of approaches that can be adopted as part of a pluralist approach to understanding the relationship between older adults and technology. An exploratory, qualitative approach, such as

this, is valuable in highlighting potential barriers to the acceptance and use of technology. Utilising this approach we can begin to identify potential usability and accessibility issues experienced by older adults which can be followed up with more specific investigations. We would advocate that a deliberately wide variety of usability methods needs to be incorporated in the pursuit of thorough understanding of the issues of acceptance and adoption of technologies by older adults.

Following on from our extended work with older adults, including the Tea Parties, we have identified a number of factors to successfully work with older adults in research:

- communicate regularly with the community about the value of their contribution, for instance with newsletters;
- eliminate barriers to participation such as transportation and forgetting the appointment;
- communicate the importance and relevance of the project to the participants, not just to them individually but also to the community; and
- develop a culture of partnership.

Tea Parties are a great way to encourage older adults to interact with new

technologies. Future work will include following up with Tea Party participants from a different older adult demographic, e.g. less physically active, and with experimental research designing specific Kinect interventions to improve mobility and increase physical activity in older adults.

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# CHANGING E-COMMERCE

Minh Tran, The Open University, overviews the e-commerce landscape, now a fully accepted channel for commerce, and invites HCI researchers to explore the new user experience scenarios within this space.

## What's next for e-commerce and HCI research?

It is difficult now to imagine the Internet without e-commerce, but once upon a time the success of e-commerce was in serious doubt. Issues such as lack of transparency during transactions, rudimentary search functions and poor website usability threatened the adoption of e-commerce. Not surprisingly, HCI researchers focused on solving those problems at that time (Nah and Davis, 2002). However, those issues seem to have been solved and are now in the distant past.

Given the widespread adoption of e-commerce on a global scale, it seems researchers and businesses have been able to solve the critical issues relating to transparency, search and usability. So what is happening now with e-commerce and HCI research? What are the current and future issues?

## Reconceptualising user experience (UX)

There is a general consensus amongst researchers that HCI should concern itself with user experience, which is broadly defined (ISO, 2008) as

... a person's perceptions and responses that result from the use or anticipated use of a product, system or service.

The focus on user experience comes with the recognition that the contexts of computer use now span across work, social and personal life (Bodker, 2006). This expanded view of user experience and use-contexts has naturally opened the door for interdisciplinary research.

One perspective that has made its way into HCI research is the consumer research and marketing perspective. Users are no longer merely users, they are consumers; they do not interact only with software and hardware interfaces, they interact with businesses, products, brands and services (Law et al., 2009).

Extending the concept of user experience to include consumer experience means that researchers and UX designers should be more aware of key marketing issues. Marketing issues have traditionally revolved around three goals (Schiffman et al., 2008):

- Providing consumer value
- Providing consumer satisfactions
- Increasing consumer loyalty

## Consumer value

Consumer value is the consumer's perceived benefit in comparison to the resources required to gain the benefit. Consumer value is high when the consumer only has to give up a little to receive a lot. What constitutes 'a little' and 'a lot' is subjective. In that sense, value differs from price. A person may be willing to pay more for water at the airport than they would at the supermarket, yet still feel that the purchase was worth making in both contexts.

The benefit that the consumer receives does not need to be tangible. It can be psychological, such as feeling happier, or functional, such as receiving entry to an exclusive club. Nor do the resources that the consumer gives up need to be monetary. The consumer may be giving up their time, energy and even mental effort.

A UX perspective that takes into account consumer value will incorporate the idea of perceived benefits and expended



resources. What is the user gaining from interacting with the interface? How much effort are they required to expend? Is the benefit-to-cost ratio fair? And perhaps more importantly, how can the benefit-to-cost ratio be maximised? In marketing, managing the benefit-to-cost ratio, or maximising consumer value, is called creating a value proposition. Marketers make it clear to consumers what the value is in using their service or buying their product. UX too may benefit from incorporating value propositions into their design thinking.

### Consumer satisfaction

Consumer satisfaction is the consumer's perception of how well a product performs in relation to the consumer's expectation of how well the product should perform. Managing expectations is critical to consumer satisfaction since expectations are used as a baseline to predict satisfaction. Expectations are partially determined by the value proposition that is advertised by the business. Expectations also come from past experience and from talking with other consumers.

While satisfaction is a familiar concept in UX, user expectation is often absent from the theoretical understanding of satisfaction. Satisfaction is usually measured through subjective ratings of ease-of-use, likeability and willingness to reuse. Incorporating user expectations will allow for a better understanding of satisfaction, which is consistent with theory from consumer psychology.

### Consumer loyalty

Loyalty, also known as consumer retention, is about developing a relationship with consumers such that they will be more likely to re-use a specific brand, product or service. Loyalty is highly correlated with satisfaction since satisfied consumers tend to be loyal consumers. However, loyalty comes from more than satisfaction. Personal values, social norms, situational factors and practical constraints (e.g. switching costs) can affect loyalty (Dick and Basu, 1994).

Increasing consumer loyalty is almost always a good investment for businesses. Not only do loyal consumers consume more of a business's products, they are also more forgiving of faults, and they are less sympathetic to competitors' messages. Thus, while satisfaction leads to loyalty, loyalty can, in turn, lead to greater satisfaction. UX designers may also benefit from creating loyal users. But how do you make a loyal user? And how does loyalty influence the user experience?

### Pushing the boundaries of technology

Apart from theoretical advances,

**A UX perspective that takes into account consumer value will incorporate the idea of perceived benefits and expended resources.**



e-commerce has interesting use scenarios that may be of interest for HCI research. E-commerce applications are no longer confined to traditional websites. Social media, virtual reality, and mobile commerce have changed the way consumers buy products and services online.

### Social media

Social media, which is a subset of social computing (Ji, 2010), is allowing consumers to find other like-minded individuals, share information, collaborate on tasks and communicate efficiently. As a consequence, users have unprecedented access to information about products and

businesses. Businesses have less control over how their advertising messages are received. Meanwhile, individuals have more power to influence other consumers through word of mouth.

Social media, however, is doing more than just connecting individuals. Social media is allowing consumers to use their power collectively. Social media sites such as Groupon, [groupon.com](http://groupon.com), and Living Social, [livingsocial.com](http://livingsocial.com), provide consumers with opportunities for greater discounts on products and services. Businesses accept smaller profit margins in exchange for a guaranteed increase in sales volume. It is a form of 'collective bargaining' that is facilitated by technology.



### Virtual reality

With computing power and bandwidth getting cheaper, mainstream users will be able to enjoy 3D graphics and have large scale multi-user interactive experiences, which were once reserved only for hardcore gamers and advanced computer users. While virtual reality in e-commerce is not mature, there are some current examples that provide a glimpse into what can be done.

Zugara Inc., [zugara.com](http://zugara.com), has developed an augmented reality shopping application. The application allows consumers to go to a website and try on clothing. The application uses a webcam to display a moving video of the consumer and then overlays different clothing onto their body in the video. The application mimics the experience of wearing clothes in front of a mirror.

Near Global, [nearglobal.com](http://nearglobal.com), and Zegna, [zegnainstore.com](http://zegnainstore.com), utilise virtual reality in more conventional ways. Near Global has created a 3D virtual world. Within the virtual world, consumers can walk along the high streets in London using an avatar. Zegna has created a 3D store that runs inside a web browser. Consumers can walk within the 3D store and inspect products off shelves.

While wearing virtual clothes, walking along a virtual high street or browsing a 3D virtual store are far from replacing real world experiences, virtual reality

technology can still provide consumers with opportunities to learn about and discover products in novel ways in the comfort of their own homes (Tran et al., 2011).

### Mobile commerce

Mobile phones are ubiquitous. They are also becoming more sophisticated and powerful. E-commerce through mobile phone, sometimes called m-commerce, is empowering consumers with more ways to shop. Maamar (2003) says that mobile phones will create a new paradigm for commerce where 'location and time will no longer constrain people from completing their transactions'.

One example of the 'anywhere, anytime paradigm' (Maamar, 2003) is in South Korea where Homeplus, [homeplus.co.kr](http://homeplus.co.kr), a supermarket chain, has made it possible for consumers to buy groceries easily while in a subway station. Homeplus placed life-size posters with images of shelves from their grocery stores. The shelves displayed grocery products along with QR codes that could be scanned. To purchase the groceries, consumers would scan the QR codes off the posters (virtual shelves) and proceed to place the order online through their mobile phone.

### Business as usual

The e-commerce landscape has changed in the last decade. There is a much

broader conception of user and consumer, with a greater emphasis on experience, rather than interactions and transactions. Social media is empowering consumers with access to real-time information and giving consumers collective bargaining power. Virtual reality allows consumers to interact with products in novel and fun ways. Mobile phones allow unprecedented convenience for making transactions.

As in the past, HCI research will continue to have its place in helping develop and understand the use of e-commerce. The issues might have changed, but the core imperative is the same: accelerate technological advancement and help the user with their (consumption) goals.

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# FINDING THE WAY



Shailey Minocha of The Open University describes award-winning research into the design of navigation and wayfinding in 3D virtual learning spaces.

## Usability problems

Our research on the design of learning spaces in 3D virtual worlds such as Second Life, [www.secondlife.com](http://www.secondlife.com), has shown that navigation and wayfinding are

the key usability problems that impact on the student experience. For example, in Figure 1, there are no directional signs at an intersection in a 3D learning space related to genetics.



**Figure 1** The problem of navigation and wayfinding. Picture courtesy of the Genome Island in Second Life.

To determine the design aspects of learning spaces that facilitate or hinder navigation and wayfinding, we have carried out interviews with designers, educators and students. We have also observed students navigating through learning spaces in Second Life to perform activities such as searching for resources, or finding the way to a particular learning space within an island, and so on.

Based on our empirical investigations and design principles from the fields of urban planning, Human-Computer Interaction, web usability, geography and psychology, we have derived guidelines for the design of 3D virtual learning spaces to facilitate navigation and wayfinding. We have also derived best practice examples for navigational aids such as maps, signs, paths and landmarks (e.g. Figure 2).

## Best paper

Our paper, [oro.open.ac.uk/29864](http://oro.open.ac.uk/29864), consolidating our research on navigation and wayfinding in learning spaces in Second Life, received the Gitte Lindgaard Award for the best paper at the OzCHI 2011 conference, [www.ozchi.org](http://www.ozchi.org), in Canberra, Australia. This award recognises not just the best written paper, but the combination of written work, along with the quality of the presentation and discussion around the work presented at the conference.

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**Figure 2** Signboard and path-defining elements guiding the way to a destination. Picture courtesy of the Virtual Ability Island in Second Life.

## Designing the User Interface: Strategies for Effective Human–Computer Interaction

The fifth edition of *Designing the User Interface* has been revised thoroughly and especially to cover mobile devices and web-based social media participation. Each of the chapters is extensively revised in the main content and the list of resources.

### Colour

There are beautiful pictures in colour throughout the book. Wordle clouds at the start of each chapter enhance the colour and the beauty of the book and also highlight the key concepts or terms of that chapter.

Throughout the book, there are boxes that list guidelines and recommendations, which can be very useful for practitioners and also for instructors who would like their students to focus on a set of principles or guidelines in a particular learning activity.

### Wide audience

As in the previous editions, each chapter has a practitioner summary and a researcher agenda. These components have been thoroughly revised and reinforce that the book is useful for researchers and practitioners alike. As the Preface outlines, the book is for a wide audience and with diverse backgrounds: researchers, students, designers, managers and evaluators of interactive systems from a variety of disciplines such as computer science, sociology, industrial engineering, social sciences, education, business, and communications.

### Pathways

There are several pathways for different course/disciplines suggested in the Preface for instructors: so, for example,

in a computer science course, you could focus on part 3 of the book, which is on interaction styles, and on chapter 10, which is on quality of service, and then on the information search and visualisation chapters. I think that instructors will find these pathways immensely useful to be able to select the chapters that are key

quality of life of people; the importance of reaching out to socially disadvantaged users, training them, designing interfaces that meet their requirements so that they feel empowered and in better control of their lives. The social media phenomenon and the creativity and user-based innovation that it has unleashed is discussed but the dangers of distraction, multi-tasking and fragmented attention have also been highlighted.

### Complex systems

The authors highlight the role of HCI in the complex socio-technical systems that are required for several important purposes: terror prevention, disaster response, international development, medical informatics, environmental protection and sustainable energy, e-commerce, government services, and creativity support. This sentence on page 584 really struck a chord with me on the significance of HCI and the role of the HCI community:

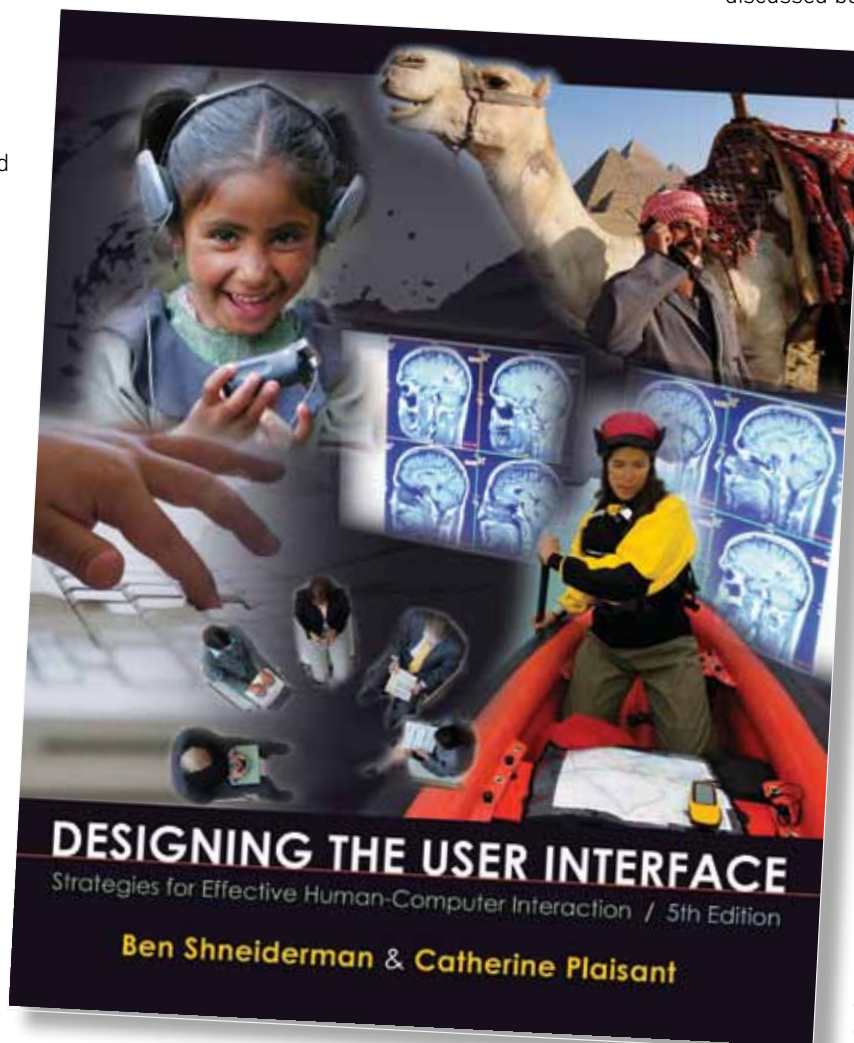
... the strength of human–computer interaction lies in its integrative approach, which combines rigorous science, sophisticated technology, and sensitivity to human needs.

The Afterword section concludes by listing the dangers of information and communication technologies, such as anxiety, alienation,

an information-poor minority, invasion of privacy, unemployment and displacement, and lack of professional responsibility. Participatory design, organisational support to user-centred design, job design, HCI education, and legislation are some of the strategies that the authors discuss as preventative or remedial measures.

### Ethical issues

While reading the book, I missed not encountering a discussion on ethical issues for HCI designers, researchers



for their discipline, and then plan the curriculum and activities accordingly.

### Afterword

In the Afterword (the last section of the book), the authors discuss their concerns about the social and individual impact of user interfaces. There are three sub-sections in the Afterword: future interfaces, ten plagues of the information age, and continuing controversies. The authors discuss the role of universal usability in improving the well-being and



## THE BOOK'S WEBSITE

The book's website outlines the key features of the fifth edition of the book, has the book's table of contents and authors' biographies. There are two sample chapters available on the website: chapter 1, which is an introductory chapter on the usability of interactive systems and chapter 9, which is on collaboration and social media participation.

This site, which provides information about the book, leads to the book's companion website. The companion website has:

- protected reader resources,
- open reader resources, and
- instructor resources.

The book includes a code, which, when entered on the website, provides six months of pre-paid access to the protected reader resources. This gives full access to self-assessment quizzes for each of the chapters, downloadable PowerPoint slides for some of the key

concepts of the book and for each of the chapters, discussion questions for further exploration, and ideas for projects, with samples of projects from courses that the authors have taught at University of Maryland and the University of Southern California.

After six months, a paid re-subscription is required to maintain access. The section on open reader resources has a blog on HCI issues. It is composed by one of the authors, but I noticed that it has not been updated since September 2009, just after the book was launched. There are also discussion questions and links to related web resources for each of the chapters in the book, and links to videos related to a range of issues including 3D virtual worlds; designing games for girls; Twitter users; healthcare and so on.

### Instructor resources

One has to register with the Pearson Instructor Resource Center to gain access to the instructor resources. My request was validated within a couple of weeks, which provides me access to the instructors' resources of other Pearson

books too. The resources for *Designing the User Interface* consist of PowerPoint slides for all the chapters, which are also available on the companion site. The additional resource available in the instructors' resources is the answers to discussion questions that appear on the book's companion site. Most of the answers to the discussion questions are extracts from the book (cut and paste of tables, etc.) but nevertheless, they are useful pointers to the questions. The resources are in editable PowerPoint and Word files and can be easily adapted to suit the context of the instructor.

Looking at the online resources on the companion website, I did wonder whether the website was being kept up to date and how challenging it would be to do so, as the design of user interfaces and users' interaction behaviours and expectations are changing at such a rapid pace.

[www.pearsonhighered.com/dtui5einfo/cw.html](http://www.pearsonhighered.com/dtui5einfo/cw.html)  
[wps.aw.com/aw\\_shneiderman\\_dtui\\_5](http://wps.aw.com/aw_shneiderman_dtui_5)

and practitioners: such as risks and possible harm to participants; seeking informed consent; the transparency that a researcher or evaluator should maintain; and the risks to the credibility of evaluators or the reputation of the discipline if ethical norms are not adhered to.

The ethical implications are particularly significant when conducting research into online communities, and a discussion in

chapter 9 (collaboration and social media participation) would have been useful.

### A book to refer to

*Designing the User Interface* is not a book that you would read cover to cover as a researcher, practitioner, and even as an instructor. You may not even follow it as the main textbook on a course that you are studying. It is a book that you

can refer to for a specific topic; say, user documentation, or information visualisation, or information search. The chapters on direct manipulation and virtual environments (chapter 4), quality of service (chapter 10), and on information visualisation (chapter 14) really stood out for me as the distinctive features of this great book, those which set this book apart from, and above, all the other HCI texts.

## ABOUT OUR REVIEWER

**Dr Shailey Minocha** is a Reader (Assistant Professor) in Computing in the Department of Computing at The Open University, UK. The focus of her research is understanding users' interactions with technology and investigating the factors that affect usability, user experience and user adoption of technology-enabled systems. Her recent research projects have involved investigating the role of social software and 3D virtual worlds in virtual team working, socialisation, collaborative learning and community building. She has also been investigating the role of 3D virtual worlds for non-teaching, research purposes, either where the behaviour of the participants becomes the object of study, or where the 3D environment is used to investigate or simulate other behaviours, such as wayfinding and navigation. Shailey's website has details of her activities and publications, [mcs.open.ac.uk/sm577](http://mcs.open.ac.uk/sm577).

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

**Designing the User Interface: Strategies for Effective Human–Computer Interaction, international version.**

*Ben Shneiderman, Catherine Plaisant, Maxine Cohen and Steven Jacobs*

Pearson Education  
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 5th edition, 2009



My PhD is based in the Programming Education Tools group at the University of Kent, and my project concerns the development of a new way for novices to enter and maintain code. Coding in schools has recently been a more topical issue than usual [1]. Most of my work so far has been about analysing existing systems, but I've also begun to work with some early designs. My review of existing systems has been structured with thirteen new heuristics. These are based on previous heuristics [7], the cognitive dimensions [2], and a wider review of the literature on novice programming errors. For specific features, Cog Tool models [4] have exposed subtle differences in the effort a novice might need to exert to make changes in two comparable code editors. Now, at the start of my second year, I am working on prototypes that might make it into a new programming tool.

## Existing systems

The current 'big three' school-level programming tools are Alice, Greenfoot and Scratch. These all use the same kinds of contexts (games, animations, simulations), but they have different styles of code entry. Alice and Scratch programs are made up of virtual Lego-like blocks, built into vertical stacks. Greenfoot is a Java system, with visual 'actors' and 'worlds' used to make games.

Most (though not all) mainstream programming systems are text-based. Programmers type heavily structured code into a text editor (whether or not it is integrated into a bigger development

## FRASER MCKAY: HCI FOR BEGINNER PROGRAMMERS

**Fraser McKay is just starting the second year of his PhD in the Computing Education group at the University of Kent. His supervisor is Professor Michael Kölling, who leads the Programming Education Tools group at Kent in developing BlueJ and Greenfoot. Fraser has a four-year BSc (Hons) in computing from Glasgow Caledonian University, where his final year work was also based on a tool for teaching programming.**

environment). The computer reads through the code and passes out some sort of feedback. The code can be cryptic – full of semicolons, brackets, and abbreviations. Some editors 'pretty-print' the text, but usually just with things like font, colour and spacing. Most editors make no allowances for small mistakes, which we know causes difficulty for novice programmers. There are also a few visual programming systems, where the programmer draws their program out as, for example, a flow chart. Lego Mindstorms' NXT-G is one that is used by some beginners.

Teaching systems that use text (and most do) often use Java and Python. These are like command-line interfaces – quick to manipulate for experienced users. They are, however, very error-prone, because also like command-lines, they use obscure combinations of commands. Recording novice programmers' habits showed that the 'trivial mechanics' of text languages – placing semicolons, braces, etc. – caused the biggest chunk of novice errors [10], and that these errors are actually quite difficult to track down and fix [3].

My main interest is in seeing whether I can combine the editing freedom found in text-based programming with some of the protection a (partly) structured editor would give a novice. Most of these have been keyboard-and-mouse based, but I've also played around with game pads, and had some sketches of other interfaces. The other part of my work will be tweaking some features of a programming language to simplify extraneous syntax, and to suit the editor designs.

## Finding heuristics

It was interesting to note Dr Gavin Sim's piece on heuristics in last quarter's *Interfaces* [11], which came out just as I was writing this. Many of the problems he describes afflicted my own initial attempts to use heuristics for programming tools. It is interesting to see his thoughts on the

datedness of some heuristics research – the last heuristics for programming education are from 1996! Pane & Myers [7] created heuristics for novice programming, some of which refer to the cognitive dimensions [2]. However, that set is very large (around 35 separate points). Because they are organised along Nielsen's (not context-specific) headings, the categorisation is not always clear-cut, and there is some duplication between categories. There are also some factors that we think are missing – if only because the set is fifteen years out of date.

Having initially tried to evaluate Scratch, Alice and Greenfoot with existing sets of heuristics, we found it hard to separate out individual problems. Some appear to fit more than one heuristic, while others do not seem to have a natural home. We realised that others were actually two or three separate problems that could be split up into different categories. At first, we tried to update existing heuristics, but they became even more difficult to apply. Therefore, with my supervisor, I decided to define new heuristics, based on the literature, working from a clean slate.

As well as internal discussions at Kent, I was able to work through them with experts on cognitive dimensions (including their creator, Green), at the 2011 Psychology of Programming Interest Group (PPIG) conference. Since then, we have gone through different versions. We are currently working on the next stage – evaluating the set for usability with a larger group of users. The heuristics have not identified new types of problem, but the contribution comes from them being gathered into one, 'neat' set.

- 1 The system should be engaging to a specific kind of user. Aspects of the system that are designed to engage should be pitched at the appropriate level – be that in the degree of challenge, competitiveness, emotional/aesthetic appeal, or subject/theme. 'Classic' programming systems like Karel the Robot [8] were based heavily around problem-solving tasks. Karel was also a character with whom learners could empathise.
- 2 It should not be intimidating in its apparent size or complexity. Where a mainstream environment is used for teaching – Visual Studio or NetBeans, for example – the editor may be unnecessarily large. It should



- be a 'safe place'; most teaching-specific programming systems are sandboxed, away from the file system and network connections.
- 3 The language should have one way to do each thing – data types, structures, built-in functions, and whatever other abstractions the system has. Hard decisions about which features to use – *selection barriers* – are a distraction for new programmers [5].
  - 4 The abstractions a system uses should be chosen carefully for the novice and the task. Pane [6] observed novices using abstract collections rather than memory-linked arrays, for example.
  - 5 The model, language (syntax) and presentation should be internally consistent; though it seems obvious, this is not always the case. For technical reasons, Java and many other languages have different syntaxes for similar abstractions in objects and primitive types, for example.
  - 6 The interface should make it easy to find related pieces of information. Where code is split across multiple files, finding hidden dependencies can be a source of difficulty.
  - 7 Secondary notations (whitespace, comments, code highlighting) should be put where they best support the programmer. Most editors use a colour scheme described by Rambally [9] as the *de facto* standard (Greenfoot adds background scope highlighting as well). There is surprisingly little research post-Rambally to find whether, in light of technical changes, there could be better schemes.
  - 8 The interface should still be simple and clear. Diagrammatic programs, in particular, become very complicated to read as they get bigger. Scratch and Star Logo blocks are also very strongly coloured, and can become quite overpowering when used in a long program.
  - 9 Syntax should be human-centric, rather than 'compiler-ese'. It does not need to be natural language, but most people do not end thoughts with an arbitrary semicolon. Full words can be more understandable than abbreviations. Syntactic 'magic phrases' like Java's 'public static void main' are also not easy to explain.
  - 10 The interface should afford the user freedom in the order they work. Novice programmers jump about when fixing problems [3], and should be able to dip in and out without the system actively interrupting them.

- 11 Changes to a program should not be 'viscous' (a cognitive dimension). This refers to the effort it takes to manipulate a particular statement in a piece of code. In Scratch, but not in Alice, blocks are difficult to remove from the middle of a stack, because they 'stick' to their neighbours; the stack has to be taken apart and put back together again, like a tower of bricks.
- 12 Where possible, the system should try to make error messages less likely. The block languages only snap together in certain ways – there are no syntax errors at all.
- 13 Novices expect incremental feedback [3]. It has to be constructive! Programming systems say things like 'syntax error' (?!), or Java's unhelpful, 'class, interface or enum expected' (and many others). On programming errors, Weinberg [12] said, 'how truly sad it is that just at the very moment when the computer has something important to tell us, it starts speaking gibberish'.

#### Next steps

My project really has roots in two fields – there being a lot of background computing pedagogy in it as well as HCI. There's also the 'psychology of programming' research, which is a bit more abstract.

My first conference as a PhD student was PPIG – a fairly small mix of psychologists, programmers, HCI people and educators (and edible, sugar-coated 'PPIG pigs' that served as prizes for well-behaved PhD students). If there are two reasons for cognitive load in programming – intrinsic (to programming) and extraneous (from the interface) – the goal here is to minimise the latter, to stop it from making programming any more difficult than it needs to be.

#### MY PHD

If you are a PhD student, 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. To submit or for more information please contact:

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## People and Computers XXVI

**12–14 September 2012**

Put a date in your diary for this year's conference. The conference in 2012 is hosted by the University of Birmingham's HCI Research Centre.

This year we have returned to the founding theme of the conference, *People and Computers*. This is to encapsulate and highlight the growing diversity of our field of HCI in one event.

Technology is now common in all walks of life and HCI practitioners and researchers have more areas of impact than ever before. We want the conference to reflect this growing importance and diversity.

## Submissions

We encourage submissions that focus on human interaction with technology and computer systems, whether your work is at the fundamental end of the spectrum (theory, design, or principle), or at the practical end (evaluation, product, or impact).

The dates for submission for each paper track are:

**Full Papers 30 March 2012**

Notification 31 May 2012

**Short Papers, WiP & Alt-HCI**

**15 June 2012**

Notification 27 July 2012

Visit [hci2012.bcs.org](http://hci2012.bcs.org) for information.

Relevant topics areas include, but are by no means limited to, the following:

- Persuasive Technology
- Mobile Interactions
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- Touchable interactions
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- Usability Engineering
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# INTERACTING WITH COMPUTERS



## Current issues

Recent issues of *Interacting with Computers* can be accessed via the ScienceDirect or Journal websites [www.sciencedirect.com/science/journal/09535438](http://www.sciencedirect.com/science/journal/09535438); [www.elsevier.com/locate/intcom](http://www.elsevier.com/locate/intcom). The latest issue is Volume 24 (1), the first of 2012. We print in this issue a list of all referees for the previous year, with a special thanks from the Editors.

## Recent papers

The ScienceDirect page also gives access to accepted *Articles in Press* awaiting printed publication. These papers can be cited with a doi, and can be downloaded in full. Recently accepted papers are notified on the journal's Facebook and LinkedIn groups pages.

## Special Issues

Four Special Issues are currently in preparation but we are happy to receive proposals for new Special Issues for 2013 on interesting, up-to-the-minute and novel areas of HCI research. We no longer, however, accept proposals which are based solely on selections from workshops or meetings, so all future Special Issues must include an Open Call for contributions.

## IwC news

At the start of a new year, I welcome these new SEB members, Sharon Tettegah (USA), Eva Hornecker (UK), Yuanchun Shi (China) and Young Seok Lee (USA).

## Special mention

Bruno Campello de Souza  
Ling Chen

## Volume 24, Issue 1, January 2012

Outi Tuisku, Veikko Surakka, Toni Vanhala, Ville Rantanen and Jukka Lekkala  
Wireless Face Interface: Using Voluntary Gaze Direction and Facial Muscle Activations for Human-Computer Interaction

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Interactive 3D Movement Path Manipulation Method in Immersive Augmented Reality Environment

Timo Partala and Aleksi Kallinen  
Understanding the Most Satisfying and Unsatisfying User Experiences: Emotions, Psychological Needs, and Context

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## Forthcoming Special Issues

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IwC Shepherd: Jaime Sánchez

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Editors: Audrey Girouard, Roel Vertegaal, Ivan Poupyrev  
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**Context-driven Human Environment Interaction**  
Editors: José Bravo, Diego López-de-Ipiña, Ramón Hervás  
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**The Social Implications of Embedded Systems**  
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# CALLS AND COMMUNICATIONS

Call for Papers

## HCSE 2012

4th International Conference on  
Human-Centred Software Engineering

29–31 October 2012  
Toulouse, France

HCSE is a working conference that brings together researchers and practitioners interested in strengthening the scientific foundations of user interface design, examining the relationship between software engineering and human–computer interaction and how to strengthen user-centred design as an essential part of the software engineering process.

### Topics include:

Case studies and tools supporting UCD approaches, domain specific best practices for user interfaces design, engineering multi-display environments, HCI models and model-driven engineering, incorporating guidelines and principles for designing usable products into the development processes, integration of software engineering and user-centred design, methods for user interface design, patterns in HCI, representations for design in the development process, social and organisational aspects of software development in a lifecycle perspective, software architectures for user interfaces, usability engineering, user experience and software design, user interfaces for ubiquitous environments, working with iterative and agile process models.

**Submission deadline: 28 May 2012**

[hcse-conference.org](http://hcse-conference.org)

Call for Papers

## UIST

25th ACM UIST Symposium

7–10 October 2012  
Cambridge, Massachusetts

UIST (ACM Symposium on User Interface Software and Technology) is the premier forum for innovations in the software and technology of human–computer interfaces.

Sponsored by ACM's special interest groups on computer–human interaction (SIGCHI) and computer graphics (SIGGRAPH), UIST brings together researchers and practitioners from diverse areas that include:

traditional graphical and web user interfaces,  
tangible and ubiquitous computing,  
virtual and augmented reality,  
multimedia,  
new input and output devices, and  
CSCW.

The intimate size, single track, and comfortable surroundings make this symposium an ideal opportunity to exchange research results and implementation experiences.

### Submission deadlines:

**Papers: 13 April 2012**

**Posters, Demonstrations and Doctoral Symposium: 29 June 2012**

**Student Volunteers: 1 July 2012**

[www.acm.org/uist/uist2012](http://www.acm.org/uist/uist2012)

Call for Papers

## SocialCom 2012

Fourth ASE/IEEE International Conference on Social Computing

3–6 September 2012  
Amsterdam, The Netherlands

The focus of SocialCom is on information and communication technologies aimed at modeling, analysis and synthesis of social interactions. The program will cover the whole spectrum of contexts where computers play a role in human-human and human-machine interaction, from co-located, face-to-face dyadic interactions up to large-scale on-line social networks. The topics include (but are not limited to) the following:

### Social Networks, Media and Services Track

Social networks; semantic web; mobile social; social media analytics and social media intelligence; services science, quality, architecture, management, tools and case studies; trust, privacy, risk and security in social contexts; social network/media/service system design and architectures; applications: collaborative filtering, bookmarking, tagging, and multi-agent systems; user generated content, blogs, wikis, and discussions.

### Social Signal Processing Track

Social intelligence and social cognition; social behaviour modelling; social behaviour analysis and synthesis; emotional intelligence, cultural dynamics, opinion representation, and influence process; reality mining; SSP in human–computer interaction and interface design; SSP in robots' cognition and action; data mining, machine learning, information retrieval, artificial intelligence in social contexts; social signal processing systems design and architectures; socially adept interfaces; implicit (human-behaviour-based) tagging; reality mining systems.

**Submission deadline: 18 May 2012**

[www.asesite.org/conferences/socialcom/2012](http://www.asesite.org/conferences/socialcom/2012)



# CALLS AND COMMUNICATIONS

Call for Papers

## ECCE 2012

European Conference on Cognitive Ergonomics

28 – 31 August 2012

Edinburgh Napier University, Edinburgh, UK

ECCE 2012 is the 30th conference of the European Association of Cognitive Ergonomics. We invite long or short papers, posters, demonstrations, doctoral work-in-progress and proposals for workshops and tutorials in the areas of cognitive ergonomics, human technology interaction and cognitive engineering. This year's theme is **Re-thinking cognition**. Cognition is no longer viewed as being merely 'rules and representations' but is now seen to be situated, distributed, shared, embodied and embedded. We invite researchers to consider how these new treatments have shaped and perhaps, even, overturned their thinking and practice. Accepted submissions in all categories will be published in the proceedings, which will also be available in the ACM digital library. Authors of the best quality papers will be invited to submit to a special issue of the journal *Behaviour and Information Technology*.

### Keynote speakers

Professor Yvonne Rogers, Director of University College London Interaction Centre

Professor Philippe Palanque, IRIT (Institut de Recherche en Informatique de Toulouse)

Professor Mike Wheeler, Dept. of Philosophy, University of Stirling

**Submission deadline for long and short papers, posters/demos and doctoral work-in-progress: 2 April 2012**

Edinburgh in late August sees the annual Festivals draw to a close. Delegates arriving early may be able to catch the final events of the Fringe, while the International Festival ends with fireworks on 2 September. We have reserved a reasonable quota of hotel rooms, but you are advised to book early!

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