User Sensitive Inclusive Design

(To be published in Universal Access in the Information Society, Springer)

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Category: Long Paper

Abstract: Although “User Centred”, “Participatory”, and other similar design approaches have proved to be very valuable for main-stream design, their principles are more difficult to apply successfully when the user group contains, or is composed of, older and/or disabled users. In the field of design for older and disabled people, the “Universal Design”, “Inclusive Design” and “Design for All” movements have encouraged designers to extend their designs briefs to include older and disabled people. The downside of these approaches is that they can tend to encourage designers to follow a traditional design path to produce a prototype design, and only then investigate how to modify their interfaces and systems to cope with older and/or disabled users. This can lead to an inefficient design process and sometimes an inappropriate design, which may be “accessible” to people with disabilities, but in practice unusable. This paper reviews the concept that the authors have called “User Sensitive Inclusive Design”, which suggests a different approach to designing for marginalised groups of people. Rather than suggesting that designers rely on standards and guidelines, it is suggested that designers need to develop a real empathy with their user groups. A number of ways to achieve this are recommended, including the use of ethnography and techniques derived from professional theatre both for requirements gathering and for improving designers’ empathy for marginalised groups of users, such as older and disabled people.

Keywords: User Centred Design, Inclusive Design, Universal Design, Older and Disabled People
1. Background: User Centered Design and Inclusive Design

The User Centred Design methodology has a long history [23], [48], [50], [61]. It was designed to ensure that developers focus on the users as the heart of the design process. Such techniques have proved to be very useful in conventional design, but, as Nielsen [48] has commented, “‘usability’ … can only be defined in terms of the specific user group for which the system is being developed”. Participatory Design is another well established technique for involving users [35], [36]. Kuhn and Winograd [29] formulated tenets shared by most Participatory Design practitioners and advocates, and Kyng and Mathiassen [30] discuss a pragmatic approach of direct collaboration between designers and users. Koskinen et. al. [28] have suggested an “empathetic design” model of involving users in product design, and Ikeya et al report that Fujitsu hired ethnographers to teach their systems engineers how to develop their sensitivity to end users [26].

User Centred, Participative and Empathetic Design all recommend close interaction between designers and users. These design techniques, however, can be less successful when the user population is very varied, and traditional User Centred Design methods provide little or no guidance about how to design for older and disabled people [4], [20], [38], [43]. Grudin [21] has commented that: “Whatever their intensions, a team relying on usability studies, for example, is unlikely to inquire very deeply into the diversity of the participants, few or none of whom they might see”. Potential diversity of users is a particular challenge when older and disabled people are involved [43]. Zajicek [67] commented that obtaining requirements and evaluation data from marginalized groups, such as older people, is not straightforward, and monitoring and interacting with disabled or retired older people in their home environment, rather than a workplace situation, can provide additional organisational challenges.

There are specific challenges when people with disabilities are part of the formal user group within a product development environment [2], [63]. These include:

- It may be difficult to get informed consent from some users
- The users may not be able to communicate their thoughts, or even may be “incompetent” in a legal sense
The user may not be the purchaser of the final product
Payments may conflict with benefit rules
Users with disabilities may have very specialised and little known requirements
Different user groups may provide very conflicting requirements for a product.

Many of these characteristics do exist in mainstream design, but difficult ethical problems can arise when involving users with disabilities in the design process, and the involvement of clinicians may also be needed [1].

There are important distinctions between traditional User Centred Design with able-bodied users, and User Centred Design when the user group either contains, or is exclusively made up of, older people and people with disabilities. These can include:

- Much greater variety of user characteristics and functionality
- The difficulty in finding and recruiting “representative users”
- Possible conflict of interest between accessibility for people with different types of disability
- Conflicts between accessibility and ease of use for less disabled people, e.g., floor texture can assist blind people but may cause problems for wheelchair users
- Situations where “design for all” is certainly not appropriate (e.g., blind drivers of motor cars)
- The need to specify exactly the characteristics and functionality of the user group
- Provision for accessibility via additional components.

“Inclusive Design” [8], [25], [27] has been promoted as a way of including the needs of marginalised user groups within the design process. Similar approaches are Universal Design [66] and Design for All [65]. They recommend that the needs of disabled people should be considered throughout all phases of product development. They have been very popular approaches to the challenges of designing systems appropriate for older and disabled people, have been very valuable in raising the profile of disabled users of products, and have laid down some important principles.

In its full sense, however, except for a very limited range of products, “design for all” is a very difficult, if not often impossible task, and the use of this term has some inherent dangers. As it is very rarely achievable, it can have the effect of designers simply paying lip-service to an unachievable goal, and the message can be interpreted to say “if you are designing a new product, take account of the needs of older and
disabled users, but only if this is easily achieved”. Alternatively, designers provide “accessibility” options which make the system accessible, but do not consider the usability of the system via the accessibility option they have provided. For example, there is a poker web site which claims to be accessible to blind people, but the speech output is incomprehensive if played at a speed which would enable the blind user to play at one table, let alone multiple tables, which is the more normal mode of play [49].

In addition, if the requirement to provide a “universal” product forms a major plank of the initial concept development and requirements gathering stage, the designer is faced with a user group who have an extremely wide range of characteristics and disabilities. It is difficult enough to conduct requirements gathering with a known and highly specified group of users – it can become impossible if the characteristics for which one is designing, in terms of physical, sensory, motor and cognitive abilities, to say nothing of culture, knowledge and motivation, are suggested to include those of the whole population. An additional concern is that the impression can be given that “universal design” is focused on modifying main-stream products - recommending that, somewhere in the design cycle, designers should take account of the unusual demands of marginalized people such as older users [43]. This suggests applying the “universal design” concept towards the end of the design cycle, which can lead to the requirements of marginalized groups being considered as an “add-on” extra to an otherwise well designed product. Not only does this patronize older and disabled people - a technological version of offering "crumbs from the rich man's table” – but is also likely to lead to significantly increased costs, and possibly to inappropriate compromises, which are bad for both the traditional and the marginalized groups of users.

2. User Sensitive Inclusive Design

Traditional User Centred Design is thus not entirely appropriate when the user group contains older and disabled people and the Inclusive Design paradigm, although offering significant advantages for these users groups, has its downsides. Newell and Gregor [44], [45], and Newell et al. [46] suggested the use a new methodology, entitled “User Sensitive Inclusive Design”, appropriate for the process of design where older and/or disabled people are part of the potential user group.
The use of the term “inclusive” rather than “universal” reflects the view that “inclusivity” is a more achievable, and in many situations, appropriate goal than “universal design” or “design for all”. Additionally, “sensitive” replaces “centred” to indicate that it is rarely possible to design a product that is truly accessible by all potential users.

This approach underlines the extra levels of difficulty involved when the range of functionality and characteristics of the user groups can be so great that it is impossible in any meaningful way to produce a useful specification of the user group, and it is very difficult to achieve a small representative sample of the user group.

The term “sensitive” also implies a different relationship with the users than the term “centred”. It suggests that the users are firstly people and that the designer should develop an empathetic relationship with them, rather than treat them as “subjects” for usability experiments. Treating users as “test” subjects can be re-enforced by the use of traditional usability laboratories where the researchers view the users through a two-way mirror, thus concealing the researchers from the users and encouraging the users to believe that they are not being observed. This discourages any meaningful relationship developing between observers and the users. Particularly when the observers are not an integral part of the research and development team, this also encourages the development team to consider users simply in terms of their stimulus/response behaviour. The authors thought that, particularly when working with older and disabled users, such a barrier would be counter productive and thus made a positive decision not include this type of usability laboratory within their new human interface research facility [46].

2.1 Prosthetic devices and/or fashion accessories

The focus on a close relationship with users recommended in User Sensitive Inclusive Design follows the tenets of Participatory Design rather than traditional User Centred Design. “Sensitive design” also encourages the designer to consider the whole person, not simply their physical characteristics. Many products designed specifically for older and disabled people show evidence that the design teams do not engage emotionally with the users groups - assuming that older and disabled people lack any aesthetic sense, and, unlike other user groups, are motivated entirely by the functionality of products. Hocking [24] reports that in the US 56% assistive
technology is quickly abandoned and 15% are never used. It is possible that the lack of aesthetic considerations and empathy between the designers and the customers is a factor in this very high level of abandonment of assistive technology products. If functionality at all costs is emphasized, the development team is likely to be focused exclusively on the ergonomic and technical aspects of the product, to the detriment of the overall impact of the final product on potential users. There can also be a wholly incorrect assumption that the additional constraints involved in considering older and disabled people means the abandonment of novel and beautiful concepts [64]. In times past, walking sticks were designed as a fashion accessory and became very popular – many modern walking sticks, however, appear to be solely a piece of assistive technology with little or no aesthetic appeal. In contrast, spectacles have moved from being prosthetic devices to fashion statements during roughly the same time period, showing that assistive technology can be designed which is aesthetically appealing or even striking and fashionable (or even fashionably unfashionable), a trend which is just beginning to be seen in the field of hearing prostheses. Thus, assistive technology can be designed to be attractive rather than discreet, understated rather than invisible – or indeed to be deliberately visible, even provocative [52]; see also [20].

2.2 Designing for Dynamic Diversity

As people age their abilities change. This includes declines in the cognitive, physical and sensory functions, each of which decline at different rates. In addition, any given individual’s capabilities will vary in the short term due, for example, to temporary decrease in, or loss of, function due to trauma, illness, blood sugar levels and state of arousal. Traditional user-centred design, however, tends to ignore the dynamic nature of users abilities and typically produces interfaces and systems which are static and which have no, or very limited, means of adapting to the changing needs of users as their abilities change. The development of an appropriate methodology for User Sensitive Inclusive Design should thus bring into focus not only the substantial variability which exists in user characteristics, but also the changing nature of the functionality they have, over both short and long time scales. This will lead naturally to the need for interface designs which are appropriate for a much wider range of functionality and to the dynamic nature of users’ functionality. The concept of Design
for Dynamic Diversity [19] provides an important step not only towards the development of more effective interfaces for older people, but also interfaces which are more effective in responding to the day to day and hour by hour changes in any user’s sensory, motor and cognitive abilities.

2.3 Defining the user group and developing an empathic relationship with them

It has also been reported that standards and guidelines are less than successful as a way of ensuring that designers are fully aware of the characteristics of older and disabled people when they are faced with new technologies [20]. Newell, Dickinson et al. [42] also reported that it was not until engineers actually met older people and saw them trying to use their paper prototypes that they fully realised the challenges of designing for that group of people. A major plank of the User Sensitive Inclusive Design message is thus to encourage designers to develop an empathy with older and disabled users, through meeting with them both in a social situation as well as an experimental one. As part of the UTOPIA Project\(^1\), the authors and others have examined various ways in which older users can be involved in a User Sensitive Design Process [11]. They recommend timetabling a period of socialising between researchers and subjects with coffee when usability and other trials are being planned. These authors also suggest a range of ways to encourage an empathetic relationship with users. These include very early involvement of users, interactive workshops, and the concept of “mutual inspiration” [11], [12], [16], [17], [39].

It is not easy to be certain that one’s sample of users is representative even with a very constrained user group, but, for the reasons adduced above, it would be impossible to produce a small set of older users who were truly representative of this population. Inclusion, particularly for older users, can be based on simplicity rather than comprehensiveness, and thus beginning the design process with a relatively narrow feature list or functionality is advantageous [51], [55]. The alternative of having too wide a design brief leads to products with a vast array of functions, which are thus bewildering and difficult to learn for everyone, but especially for older people.

\(^1\) Usable Technology for Older People: Inclusive and Appropriate, http://www.computing.dundee.ac.uk/projects/UTOPIA/
It is thus recommended that design teams (which should include industrial designers, interaction designers, human factors specialists, and engineers working together) should be encouraged to consider a number of specific “outriders” in depth—and, initially at least, design for them in particular. These “extra-ordinary users” [40], [43], [56] should contain the characteristics which are particularly relevant to user groups for whom the product is being designed. Each “extra-ordinary user” should be considered as an individual person who happens to have a specific disability, as well as a range of other characteristics which are important for defining them as a person, but may not be related to their disabilities. In this way, the designers are given a clear picture of a person, or small group of individuals, for whom they are designing, and can develop an empathy with these potential users. Thus, the design process is focussed on potential users, but the lack of a truly representative sample is recognized by the team. This methodology will encourage the team to address access issues from an empathetic viewpoint [56]. Engaging with such users can also provide a richness to the design process, and a consideration of “extreme” users can act as an effective provocation within the design process, which inspires the user-centre design methodologies of commercial design groups such as IDEO [37], [47].

2.4 Critical Design

Design skills can not only be used for solving problems, but also for making issues visible and tangible, and thereby facilitating discussion and decision-making within design teams and between designers and users. The emerging approach of *Critical Design* is used to ask questions about the future path of technical development, instead of directly providing solutions.

Dunne suggests that critical design is “design that asks carefully crafted questions and makes us think”, as opposed to “design that solves problems or find answers” [14], [15]. These techniques have been employed to provoke discussion about the social and ethical implications of technology, between designers, and amongst businesses and the public. Critical design provides a healthy challenge to a comfortably resourced status quo, and has been applied to many important social issues, from the ethics of energy production to privacy in an age of wireless communication. Pullin [51], [53] argues that disability is another issue profound enough to merit the use of critical design techniques. In a field where so many everyday needs go unmet,
however, the idea of design that does not provide direct solutions may seem wasteful and self-indulgent. Also, critical design often relies on being uncomfortable or employing a dark humour, and these might sound like inappropriate tools to bring to bear on the sensitive issues around disability.

There is clearly a tension between being sensitive to often negative perceptions of people with disabilities, yet taking disability seriously enough to challenge ingrained opinions. Disability groups and researchers, however, are already beginning to exploit critical design as a tool to provoke discussion about issues that may otherwise go undiscovered [51]. These include the often unspoken assumptions inherent in current development and design for disability. Should hearing aids be invisible? Should prostheses mimic human flesh? Should it matter what equipment for visually impaired people looks like? Should the goal of assistive technology always be independence rather than interdependence? Critical Design is providing interesting ways of addressing such issues.

3. Ethnographies, Personas and Scenarios

A range of techniques have been used to inform design teams of the characteristics of the user group. One of these is to conduct formal ethnographies [18] and present the results from such ethnographies to the design teams. Such processes are normally conducted by professional ethnographers and presented to the design team as a report, or more frequently nowadays through devices such as blogs (see, for example, Jan Chipchase from Nokia - http://www.janchipchase.com/), videos or other forms of interactive presentation. Thus, although the data collected will be of high quality, the design team will not normally have had any direct interaction with the user group, and will be expected to obtain their understanding of the characteristics of the group through the ethnographic materials presented.

Profiles, or personas, and scenarios have also been used to communicate the characteristics of users to design teams. “Personas” are fictional characters instantiating an array of qualitative data representing the user group [9] and scenarios illustrate how users may react to equipment within realistic situations [3]. Personas are normally developed by the technical R & D team, and are regarded as a positive complement to existing techniques such as scenarios and task analysis [6], and a
growing body of literature indicates that these concepts are used within the design community, particularly by software and interaction designers [22], [57]. It is claimed that Personas promote engagement of designers over a period of time, which in turn promotes insights into users’ goals and the way in which users might respond to design features. Grudin [21] gives a very detailed justification for the use of personas, but Laurel [31] comments that “Personas are less effective if the audience is diverse”. Some disadvantages of scenarios have also been reported, and for example, Grudin [21] comments that “the (portrayal of the user) is not engaging…..it is not generative – it provides no handle for thinking about a new situation”. Similar objections could have been raised about traditional ethnographic reports, but the trend now is for ethnographers to be embedded within the design teams. An ideal situation would be for the design team to have extensive involvement with a wide range of potential users, but this can be difficult to organise. Particularly with frail older people, those with dementia and certain categories of disabled people, there can be significant ethic issues of direct contact between design engineers and such potential user groups. In some countries there are also significant legislative barriers in working with people who cannot give informed consent. In addition, as Sims points out, cost constraints on design projects may prevent designers from accessing ‘real’ users [62].

4. Professional Theatre

Newell, Carmicael et al. [41] suggest a solution to this challenge – the use of well briefed professional actors working to a well crafted script. Versatile theatre professionals provide a personification of the particular user or set of users within the design brief, and, if these actors are experts in improvisation, will be able to interact in character with designers, and with any prototypes which are produced as part of the design process. Other advantages of this approach include a removal of ethical issues which can arise when the design brief includes fragile people, either physically, mentally, or in terms of self-confidence. An actor's ego is not involved in the character they are playing, and thus the design team can be much more probing or even brutal in their questioning. An acted performance can also be a very powerful and valuable way of presenting a design to clients, with, again, the safety which comes with the use of actors.
The use of professional actors in design development has been reported by Salvador & Howells [59], Sato and Salvador [60], and others as a very useful and interesting way of establishing a common shared context for audience participants. Sato and Salvador [60, p. 37] commented that “Live performers cast a spell over the room; there was a heightened awareness and tension, and live actors can produce engaging and interactive experience” (they answer questions from audience more effectively and efficiently than a moderator, and can facilitate the session rather than, for example, focussing on technical detail). Dishman [13] and others have used actors in unscripted live drama to address design requirements for older adults, which Dishman calls “informance design”.

The Dundee based Foxtrot Theatre [in Education] Company, and latterly MM Training (Dundee), has developed and used a form of interactive theatre extensively within professional training of communication skills (e.g., within palliative care and training medical students), and in community consultation (including with seniors). This led to a series of collaborative projects with the School of Computing which addressed issues related to the impact of new technologies particularly on older people [34]. A script writer conducts detailed research on the subject area and then produces a series of short plays which address the important issues to be discussed, but within a narrative style with the emotional content and tension essential to good drama. These scripts have a ‘beginning’ and ‘middle’ but often no ‘end’. In the live version of this form of theatre, the play is performed and, when it reaches the end of the scripted section, the audience is encouraged by a trained facilitator to address the issues raised in the play, including the characters’ different motivations and emotions. In addition, the facilitator may insert pauses at appropriate points during the play, and ask the audience what the various characters are thinking and/or what they should do about the challenges which have been illustrated. All discussion, debate and criticism are focussed on the story and the characters. This provides a safe environment which enables the audience to discuss, argue, inform and share needs and experiences. The creation of characters in life-like situations results in a ‘reality’ with which audiences can identify and empathise, directly relating the action to their own experiences and expectations. “Hot seating” can also be used, where the actor stays in role and replies to questions from the audience.

This technique has been found to be a very powerful method for facilitating the discussion of sensitive issues via dialogue within the audience and between the
audience and the actors (who stay in role). This enables the members of the audience to understand the views and motivations of other groups within the audience, and those groups represented on the stage.

4.1 The Process

The success of this type of presentation, however, relies on the skills of the script writer, the director, and facilitator, and the improvisational skills of the actors. The process can be divided into:

- Producing the script – in collaboration with the researchers
- Briefing and rehearsing the actors
- The performance
- The facilitation of the interaction with the audience.

The script must be written in close collaboration with the researchers. The researchers need to convey their aims accurately and clearly to the writer: the questions they want answers to and/or the information they wish conveyed. The writer’s task is to translate these research issues into a good story that will work dramatically. This involves much iteration of concepts and draft scripts. The structure of a dramatised story with its tensions and conflicts is actually a very appropriate way to illustrate the challenges people can face with technology. Theatre can create the “story of an interface”, illustrating, its possible usefulness, design and usability, and how a human being, with a range of attitudes, emotions, physical difficulties and needs may interact with it. A close rapport between the writer and the researchers, however, is needed to achieve this.

This form of theatre requires experienced professional actors who can take direction and immediately, or almost immediately, produce believable characters. The actors which have been used in the work reported in the next section are also experienced in interactive theatre, and able to ‘suspend disbelief’ and engage an audience without the normal technical aids of a full theatre production. The actors and the director need to be well briefed into the aims of the theatre: the way the pieces of technology are supposed to ‘work’, how this might relate to the life style and needs of the character, and what questions might arise in the audience that they may have to react to. It is thus extremely useful if one or more researchers can be present for some of the rehearsals.
The facilitator must thoroughly understand the issues which the researchers need investigated. Their task is initially to explain to the audience how the process will work, and provide a brief, relaxed ‘warm up’ session to establish a rapport with audience. When facilitating discussions, it is important that the questions asked are as open as possible, and that all contributions from the audience are accepted unconditionally. The facilitator will often need to repeat or paraphrase what an audience member has said as a reinforcement. If conflicting attitudes and perspectives come from the audience, the facilitator needs to sum up these divergences. If the focus of the discussion is being lost, it is regained by referring back to the story. A well trained researcher can act as a facilitator, or it may be appropriate for one of the researchers to act as a co-facilitator to supply technical information. The value of this technique is that the performance of the story maintains the focus of the discussion, and the characters bear the brunt of any negative comments. This ensures that the audience increasingly engages and feels comfortable to join in discussions. Much data has been gathered using these techniques, and normally the whole process is recorded (unobtrusively but with permission) for subsequent transcription and analysis.

4.2 Examples of the use of theatrical techniques

These techniques have been used by the team at Dundee University in a number of requirements gathering situations, including for a video based fall detector [32] and for applications of interactive television [58], and more recently for facilitating discussions on potential user responses to a digital television based prompting system for people with mild dementia, and for examining the requirements for smart houses with multiple stakeholders. This group has also used live theatre and video extensively to raise the awareness of engineers of the challenges faced by older people in their use of technology. The “UTOPIA Trilogy” [33] was a series of five minute narrative videos which addressed the issues faced by older people when trying to use an email system, install a web camera and use a mobile telephone. These videos were shown to be very effective in changing the attitudes of both undergraduate computing students and HCI professionals in the challenges presented to interface designers by older people [5], [41]. “Relative Confusion”, a twenty minute video, addresses the issues of interface design by charting the course of an
older person trying to install and use digital television. Initial evaluation of this video indicates that it too is very useful in raising awareness and changing attitudes of design engineers\(^2\). In addition, the group have used a combination of film and theatre in two sets of experiments. Part of the UTOPIA Trilogy was shown to an audience, and this was followed by a dialogue between the audience and the actors who played parts in the UTOPIA Trilogy. The actors were in role for the whole of piece, and the presentation involved a combination of “hot seating”, with the actors [as older users] confronting the audience of potential designers of equipment with why the systems are unusable by them, and asking them “what they are going to do about it?” This combination of video and live theatre was used at the British Computer Society HCI 2006 Conference held in London in 2006, and was very successful in encouraging discussion of the HCI needs of older people. A similar event was held for computer science undergraduates, who commented that the introduction of live actors made the session particularly memorable. A live theatre event was also commissioned for an international conference to address the issues people will have with new technologies, in this case “ambient intelligence” [10]. The two 7 minute plays, which examined the use of ambient intelligence in an airport and in a domestic situation, were very well received by the audience and created a substantial amount of discussion with particularly successful hot seating of the actors.

Although the use of actors may not be wholly appropriate for very detailed evaluations of user interface, it is believed that it has major advantages when a more holistic approach is required, and for very novel design briefs, where an entirely new technology is being developed. Script writers and actors are trained as professional observers of human behaviour, and their skill is presenting that behaviour in a way which engages the viewer/audience. A good script writer is skilled at producing a “tight” script in which every word counts towards the narrative, and which provides a very economical method of transmitting information. A good actor knows how to present the relevant characteristics of personalities in an engaging manner, whilst retaining veracity. Both use techniques such as humour and tension as methods of inserting important points into the narrative. Theatre professionals, although not having the analytic perspective of a trained ethnographer, in a sense, have been trained to be “what if ethnographers” – i.e., professionals who, on the basis of their

knowledge of the characters they wish to present, consider how they might respond to new situations. They are also trained communicators who can present the results of their research in very powerful and effective ways. Laurel [31] claims that successful movies have 30% action, 17% comedy, 13% good versus evil, 12% sex/romance, 10% special effects, 10% plot, and 8% music. Most of these characteristics do not exist within traditional focus groups and usability tests, but the work discussed here shows that the characteristics suggested by Laurel have proved to be very effective in stimulating responses to design challenges, as well as creating an enjoyable experience for the audience.

Clearly, there is potential here to consider performance as a bridge between ethnography and design; i.e., a tool for making ethnographic insights more visible, exploratory and exploitable within design processes. Whilst design ethnographers are increasingly turning to more creative ways of communicating their insights, and are frequently embedded within design teams rather than working alone and sending in ‘missives from the field’, theatre could provide a medium through which insights can be communicated and ‘what if’ questions explored with the whole spectrum of design stakeholders. Theatre also offers potential within the context of the open innovation methods [7] being championed by, amongst others, Intel, Cisco, Nokia and IBM. A key component of the open innovation approach is a commitment to involvement with large numbers of users - for example Nokia now say that for every developer on a project there must be 50 users involved. Theatre is one way of involving large numbers of users in design projects, who can be purposefully and meaningfully brought together as an audience for a theatrical presentation.

Finally, theatre encourages a creative approach to design, involving users as well as designers. This is in contrast to the traditional view of focus groups and usability testing being solely a method of eliciting users’ views and opinions, and to determine their abilities to use specific interfaces and systems. Employing theatre professionals clearly involves costs. These depend upon the amount of research which the script writer has to do, the number of actors used, the number of performances, and whether or not video is used. Within the UK, “Equity”, the theatre professional’s trade union, publishes recommended rates. In the authors’ opinion this is money well spent. The results which have been obtained clearly justify the cost, and it is unlikely that amateur actors would have the skills necessary to perform this type of interactive theatre to the standard required to be effective in the situations in question.
5. Conclusions

Inclusive approaches to usability require that researchers and designers consider all potential user groups of systems, including minority groups such as people with disabilities. This means that the user groups have too broad a set of functionalities and characteristics to be encompassed within traditional User Centre Design methodologies, and there are additional ethical and other challenges in dealing with this user group. Rather than produce a whole new paradigm, however, it is suggested that the methodologies of User Centred Design be extended to form a paradigm which could be called User Sensitive Inclusive Design. This should include not only experimental techniques, but also methods for communicating the results of the research effectively to mainstream researchers and product developers. Adopting a User Sensitive Inclusive Design approach facilitates researchers and developers in the field to develop better specialised equipment, and also provide mainstream engineers with an effective and efficient way of including people with disabilities within the potential user groups for their projects.

In some circumstances, it may prove difficult for designers to interact effectively with older and disabled people. This paper has shown that the use of theatre (which includes humour and conflict) can be a very powerful method of communicating messages between designers and users of technology. Live and video based Interactive Theatre have been shown to be successful both in requirements gathering and in raising both student and professional designers’ awareness of the challenges which new technologies present to older and disabled people.

Acknowledgments

The work reported was funded by the Scottish Higher Education Funding Council, the Engineering and Physical Sciences Research Council, and the Leverhulme Trust, who funded Ms. Morgan as Artist in Residence in Applied Computing.

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