

Improving Life Quality by Countering Design Exclusion

Roger Coleman MA (Hons) Edinburgh FRCA FRSA
Jeremy Myerson MA (RCA) FRSA
The Helen Hamlyn Research Centre, The Royal College of Art,
Kensington Gore, London, United Kingdom
e-mail: hhrc@rca.ac.uk
website: www.hhrc.rca.ac.uk

R. Coleman, J. Myerson, Improving Life Quality by Countering Design Exclusion, Gerontechnology, 2001; 1(2): 88 - 102. This paper concerns itself with design exclusion, and strategies developed to counter this at the Royal College of Art (RCA), in London. It showcases work resulting from the DesignAge programme, from 'design for our future selves', an annual competition for final year MA students at the RCA, and most recently, from the Helen Hamlyn Research Associates Programme, with teams of recent RCA Masters graduates with major companies and voluntary sector organisation. This work has helped to flesh out the concept of Inclusive Designs, in particular by developing an 'empathic' design process whereby RCA graduates work with 'critical' user groups – often consisting of older people – to develop 'inclusive' products and services, and introduce new thinking into companies.

Key words: Design Exclusion, Inclusive Design, Empathy, Innovation, Critical Users

As people age, they change, physically, mentally and psychologically¹. The gradual accumulation of multiple, minor impairments – of reductions in eyesight, hearing, dexterity, mobility, and memory – impacts on their ability to maintain active and independent lifestyles. Older people can be denied the ability to participate in social life as a result of mismatches between the environment they live in – buildings, products, and services – and their own changing capabilities². Since we live in a world that is constructed and designed almost entirely by human beings, people who experience such mismatches can be said to be excluded by design. However, age-aware design can eliminate mismatches and so include those who might otherwise suffer from design exclusion³⁻⁵.

DESIGN EXCLUSION

Many groups are currently excluded from the mainstream design process. This design

exclusion takes several forms: older and disabled people suffer from it; so do certain economically vulnerable groups such as manual home-workers, and those marginalised by changing technologies and work practices. In a period of rapid social and technological change, bringing people from the margins to the mainstream of society through inclusive design is important not just from the perspective of social equality but also for business growth through new products and services. Unfortunately, in many research and development programs there is an implicit assumption that the needs of older people and disabled people are the same, a failing that has held back progress towards an inclusive society. To correct this, we need ways of understanding and quantifying capability that more accurately reflect the number of people likely to be disabled or excluded if specific factors are not taken into account in the design process. Also required

is a shift in the perception of disability away from physical and mental condition towards inadequacies in design, and a shift in professional attitudes away from the stigma of what have for too long been referred to as 'aids and adaptations' towards an ethos and aesthetic of enabling design. In short, by better understanding design exclusion, we can develop the professional and business strategies that will lead to design inclusion.

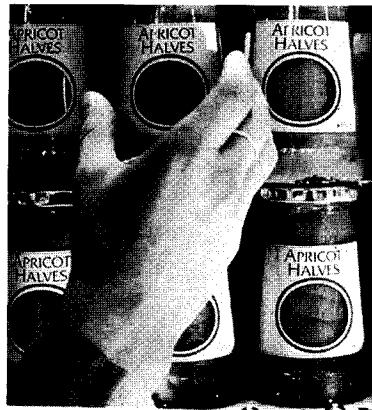
The European Union has begun to recognise the importance of adopting an inclusive or Design-for-all approach⁶ and efforts in the UK are now being concentrated on developing the design and management tools and strategies that can deliver a meaningful response to issues of population ageing and disability, e.g. through DTI-funded work on extending ergonomic data to include the capabilities of older people⁷, the DTI Foresight EQUALS research initiative, which focuses on the need to improve the quality of life of older people, and the Design Council's recent Policy Paper 'Living Longer' advocating inclusive design as a key strategy for business and government⁸.

EXEMPLARS OF AGE-AWARE DESIGN

By creating inclusive design exemplars it is possible to envision a user-friendly future, in which design and technology include rather

than exclude, offering improved quality of life to people of all ages and capabilities. The Royal College of Art (RCA) has a longstanding interest in addressing these issues through user involvement in the design process, dating back to an R&D program that delivered the standard UK hospital bed design in the 1970s. In 1991, the DesignAge program was established at the RCA to 'explore the design implications of ageing populations', and in January 1999, the Helen Hamlyn Research Centre (HHRC) was launched with a broad social mission to explore inclusive design in a period of rapid social and technological change. Key aspects of this work have been the involvement of groups of 'critical' users – primarily older people, but also carers, homeworkers, and young disabled people – and of industrial and voluntary sector partners who can put the research and designs into practice. By 'critical' users we mean people who are not normally taken into account in the design process and therefore likely to suffer from design exclusion, and also users who are prepared to engage in discussion and be involved in the design process itself.

For example, under the DesignAge programme, postgraduate design students have worked collaboratively with older people, through an association with the University of



Figures 1 and 2. 'A jar we can all open'. Easy-grip/open glass packaging by Gavin Pryke, RCA Ceramics and Glass. Design for our future selves winner, 1994.

the Third Age (U3A), a fast-growing and self-organised association of retired people. U3A members attend regular User Forums at the RCA, where they meet students, participate in focus groups and other research activities, and discuss consumer issues with professional designers and industry managers⁹. This interaction with older consumers gives students a rapid insight into how to develop appropriate products and services – and the pitfalls that await them if their approach can be seen to be in the least patronising – and offers an opportunity to talk through ideas, develop concepts, test prototypes, and research specific issues of styling, aesthetics and usability.

The average RCA student is aged 27, and although many arrive with a high degree of social concern and some professional experience, it is not easy for them to grasp the significance of designing for people whose wants, needs, and aspirations are not the same as their own. The theme of 'design for our future selves' was therefore developed to encourage young designers to think in terms of products and services that engage with ageing as a natural part of the life-course¹⁰.

The program has concentrated on the convergence between social and commercial imperatives, on arguing the case for age-friendly design and encouraging industry and the design profession to recognise the opportunities offered by an older consumer market. RCA graduates reach a very high standard during their two-year practice-based MA course. In the design disciplines well over 90% are employed within industry, and their experience at the RCA can have a significant influence on the design culture in major companies around the world.

Design exemplars have come from an annual competition at the RCA, and from collaborations with industry and professional designers. The competition began in 1994¹¹, and over the years, the many entries have served to establish a body of work showing that by including the needs of older people it is possible to design better solutions for all ages and abilities. The entries extend from fashion, furniture, and transport design to the metal and jewellery crafts, and from architecture, interiors, and industrial design to computer interface design, ceramics, and glass. The diversity of the competition pro-



Figures 3 and 4. 'Printed sound'. A scanner that reads encoded sound/speech, making speaking bills and other documents possible for vision-impaired people, by Charles Cooke, RCA Industrial Design Engineering. Design for our future selves winner, 1998.

jects demonstrates how traditional objects can be redesigned, and new concepts developed. Some of the designs represent a sense of freedom and escape, such as yachts or

cars or floatation platforms to view the underwater world from. But most home in on the practicalities of restricted lives, with ideas to support household chores, reading,



Figures 5 and 6. 'Eating in style'. Insulated dishes, easy-grip beakers, and mapable place settings that allow stroke patients to feed themselves without food going cold and without feeling institutionalised. Based on extensive user-research with stroke patients and their carers undertaken by Lisa-Dionne Morris, RCA Design Products. Design for our future selves winner, 1999.



Figure 7. 'Pull the plug'. A simple, low-cost, colour-coded plastic strip that makes electric plugs easy to pull out. The coloured plastic strip meets current UK IEEE regulations and also makes for easy identification of plugs attached to different appliances. By Martin Bloomfield, RCA Industrial Design Engineering. Design for our future selves winner, 1999.



Figure 8. 'Water world for all'. A recreational floatation platform, offering less confident swimmers of all ages a way to enjoy observing underwater life, by Richard Perez, RCA Industrial Design Engineering. Design for our future selves winner, 1996.

sitting, standing and staying warm, and extending into humanising hospitals and residential care. Personal alarms, steps, and purses that cannot be snatched are small advances that could make life worth living for many older people. These designs offer greater self-determination, mobility, and choice for a section of the community that has been overlooked until recently. By no means all of the projects are aimed directly at the mature market, but in tackling such issues as living alone, they bring the age issue into focus.

INCLUSIVE DESIGN: DEVELOPING THEORY THROUGH PRACTICE

The DesignAge message is now a core theme of the HHRC, where the research focus is 'inclusive design', a term used to describe a process whereby designers ensure that their products and services address the needs of the widest possible audience. It combines the

perspectives of technology push and demographic pull in ways that include the needs of those groups of people in society who are currently excluded from or marginalised by mainstream design practices, due to age or disability or rapidly changing technologies and work patterns. It links directly to the political concept of the inclusive society and its importance is increasingly being recognised not just by Governments as a focus for social equality but by business and industry as a tool for commercial growth¹². At the Centre, inclusive design is seen as a strategy that can be employed to improve the quality and usability of products, services, buildings, and communications. A key factor is the emphasis placed on working with specific groups facing design exclusion in order to better understand how to overcome it.

In 1999, following on from their Masters programme, and under the newly instituted Helen Hamlyn Research Associates programme, ten RCA design graduates were teamed up with ten industry partners to undertake a range of one-year collaborative research and development projects responding to social and demographic change. In 2000, 14 RCA graduates joined the programme, and a further 13 began their Helen Hamlyn Research Associateships in October 2001. This has entailed working closely with a wide spectrum of users to reshape the design process to their needs. Visually impaired travellers have journeyed through Heathrow Airport; disabled teleworkers and low-paid pieceworkers have described the frustrations of working from home; older people have given feedback on supermarket labelling and domestic appliance instructions; osteoporosis patients and paraplegics have tested prototypes; and office workers have revealed the limits of balancing life and work. Some of the outcomes of the programme are patented innovations and designed artefacts: new furniture, products, and architectural structures.

In other cases, design skills have been applied to the research methodology itself,



Figure 9. 'Aspis'. A multi-purpose purse developed by Constantine Hoursoyglou, RCA Industrial Design Engineering. Developed with a user group including older joggers, the purse offers security, and a small integrated push-pump creates a vacuum to stop keys and coins rattling. Design for our future selves winner, 1997.

as in a study that equipped flexible 'knowledge workers' with special diaries and cameras to record their working lives. The results point towards the emergence of a new 21st century design paradigm, in which recognition and inclusion of the special and acute needs of different users in the design process will lead towards better solutions for all in society, and broader markets for business.

The work of the Research Associates programme has helped to bring the idea of inclusive design into greater focus. When we started this programme two years ago, the concept was still bound up in many people's minds with attempts to make design for disability less of a minority activity. That automatically signalled special equipment for special needs, with small production runs and limited economic significance, and with the added assumption that for design purposes, older people and disabled people could be regarded as essentially one group. But attitudes have changed rapidly. Today, there is growing recognition that people of all ages and abilities should not be marginalised, but should be brought into the mainstream of society, and that inclusive design is not just socially and politically desirable but also makes real business sense in terms of opening up broader markets. Inclusive design transfers responsibility from the user of design to the design process itself. If designers (and the companies who commission them) do not accept responsibility for what happens when people try to use their designs, then the net outcome is design exclusion. In attempting to address design exclusion, the Research Associate Programme and its partners have sought to marry technological perspectives on change (which shape new ways of living and working) with more traditional demographic ones (which predict such trends as population ageing).

R&D narratives and an empathic model

Three research and development strands or 'narratives' been developed to express aspects of inclusive design thinking. 'Age

and Health' focuses on encouraging a more active and independent lifestyle among older people, and recent projects range from designing ways to make those at risk of heart disease take regular exercise to developing tools to make it easier for older DIY enthusiasts to renovate their homes. 'Working Lives' explores design issues related to changing patterns of work. These span from architectural studies looking at workspace as an agent of urban regeneration to furniture projects addressing the individual concerns of work-life balance. The third narrative is 'Urban Mobility', which explores the use of new technologies and design methods to improve mobility and way finding in city centres and airports.

Overall, what all these diverse projects share is an emphasis on understanding and interpreting the user experience. We have developed what we describe as an empathic model for design innovation, where designers work closely with groups of users who challenge their preconceptions, open their minds, and help them rapidly identify and focus on key design factors. In the process we have discovered that pairing bright young RCA designers with 'critical' users (from older walkers to desk-bound office workers to wheelchair travellers on public transport) is a trigger for design innovation. Often working one-to-one with individual users, our Research Associates rapidly bond and empathise with their users, which motivates them to develop solutions that not only address physical issues of capability, but also engage with aspirational and lifestyle goals, enhance self-esteem, and offer pleasure in use. Empathy is the key word and, when combined with creativity, it holds the promise of more popular and attractive design solutions for everyone in the future.

CASE STUDIES

Process to Pleasure –

instinctive way finding at Heathrow airport

The scale and complexity of the modern airport terminal makes way finding for even the

most experienced traveller difficult. Add the physical impairments that result from ageing, and airports become an especially daunting prospect for older users. This socially inclusive project teamed two RCA architects Karen Adcock and Carl Turner, with the British Airports Authority (BAA) development group designing Terminal 5 at Heathrow. Its aim was to define and explore a range of inclusive design ideas in order to improve instinctive way finding for all, in what will be, subject to the public enquiry, Europe's largest airport terminal.

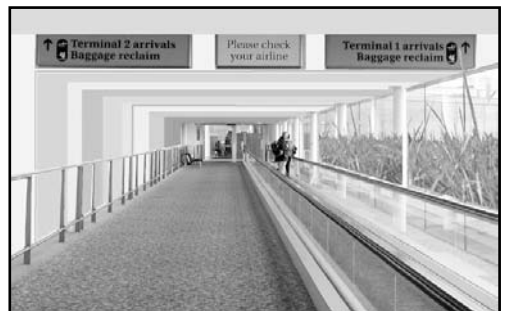
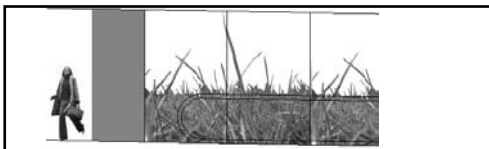
The study investigated current practice in airports around the world. Visually impaired travellers were adopted as a 'critical' user group, and user trials were carried out at Heathrow Terminal 4 in collaboration with London Regional Transport, Royal National Institute for the Blind and the University of the Third Age. From the findings that emerged, the project overlaid a 'sensory map' for T5 onto the existing framework being developed by the BAA team. This formed an alternative reading of the terminal, comprising a series of strategic measures designed to manage the scale of the building and provide information, orientation, and comfort for travellers through 'landmark interventions' using colour, form, texture, signage, sound, structure, and furniture which collectively form a 'sensory landscape'. BAA considered the results important enough to continue the

collaboration for a further two years, and in year two of the study the proposals were developed for practical application and evaluation on a test site in Terminal 1: the Europier, a notorious hotspot for way-finding problems.

Initial concepts were reviewed in tests with the 'critical' user group of visually impaired travellers at Heathrow, existing design solutions were audited and user behaviour observed among passengers arriving at the Europier. In a resulting design scheme, new signage and a colour coding system identified key routes; applied seasonal window imagery, and a 'chromawall' with coloured bands increasing in intensity, sought to reduce perceptions of distance; and a lighting installation illuminated the key decision point for arriving passengers. Elements of this scheme were costed for construction at Heathrow. The study will now go into a third year to assess the built prototype with users, conduct a parallel analysis of other buildings and industries with way-finding issues and develop a web-based inclusive design resource for the BAA Terminal 5 design team, and the research partner, BAA plc.

Playground – inclusive design for disabled teleworkers

Two social trends informed this project. First, the rapid growth of teleworking in the UK. Second, the above-average levels of unem-



Figures 10, 11, and 12. Elements of the proposed sensory landscape for Terminal 5 at Heathrow, including high visibility signage, natural imagery, and use of colour to reduce distance, with a simulated application to a traveller area.

ployment among Britain's 6.2 million disabled people, many of whom would like to participate in the UK's information technology economy, but are prevented from doing so by lack of appropriate tools and support. Working from home is often the only chance for people with disabilities to work at all because the home can incorporate the care and rest facilities they need. But, equally, poor furniture and layout can be a barrier to becoming an effective teleworker.

With the support and partnership of major UK charity, Leonard Cheshire Foundation, designer Lotta Vaananen set out to make site-specific design proposals for individual disabled users as exemplars of an inclusive approach. The habits and needs of disabled teleworkers were investigated through visits and an e-mail questionnaire. From the find-



Figure 13. 'Carousel'. The swivelling workstation for wheelchair users is ideally suited to modern offices.



Figures 14, 15, 16, and 17. 'Swing'. Working with critical users led to an adjustable solution, rendered as a computer animation.

ings, the designer worked closely with five users in their homes to develop design briefs. Two new furniture products illustrate a move away from hospital-style appliances towards a more playful spirit. Carousel is a large, horse-shoe-shaped desk designed to give wheelchair users the maximum work area from one single point, and with a turntable beneath to simulate the movement of a swivelling office chair when the wheel chair is driven onto its platform.

Swing is a chair for computer users who suffer from severe back pain, many of whom are older people: it can be hung on pivot points from a support frame from different angles to change the pressure points on the body, and it has a special mattress with ergonomically designed pockets that can be filled with different materials to customise support for the neck and lumbar regions.

Impact Wave – clothing that cares and protects

Clothing that provides a level of physical protection while being comfortable to wear is a holy grail in the apparel industry; it has been described as the search for the 'magic t-shirt'. Body impact solutions currently available to the consumer are limited because they are either based on a rigid exterior shell (such as roller blade pads) or some form of foam laminate (ski pant inserts, for example). The former are too inflexible; the latter do not work effectively. This R&D project, by designer Dan Plant, has developed a new flexible system that is incorporated directly into the garment to protect the human body against impacts and abrasions. It comprises two materials combined in multi-layers that stiffen upon impact to provide protection, but flex with the musculature of the body when protection is not required, thus combining safety with comfort.

The study looked in particular at applications related to older people. It examined the problems associated with hip joint protection of osteoporosis sufferers and frequent fallers.

User groups were undertaken in conjunction with Research into Ageing and AgeNet.

Independent technical tests confirmed that the new system, entitled Impact Wave, is up to 10 times more effective on pressure distribution and three times more effective on force than conventional foam and plastic systems with the added benefit of flexibility. The project sought a balance between wearability and compliance to safety standards, and also investigated other potential work wear, leisure and sports markets.

Foot print – a campaign for walking the way to health

A study undertaken by designer Ellie Ridsdale in collaboration with research partner, British Heart Foundation, looked at ways in which communication materials such as posters and maps can encourage people at risk from heart disease to join local walking groups and exercise regularly. Coronary heart disease is a killer. In Britain, one in four men and one in five women die every year from the disease. It accounts for 135,000 deaths and costs the UK healthcare system



Figures 18 and 19. 'Impact wave'. Prototypes developed for user-testing, and to establish the principle of creating joint-specific protective 'cages'.



Figure 20. 'Impact wave'. Direction of protection for the hip joint.

around £1,600 million. But just 30 minutes of moderate physical activity such as regular walking on five or more days a week will significantly reduce the risks of a heart attack. Unfortunately 70% of the UK adult population does not get enough exercise. Walking The Way To Health is a national initiative run jointly by the British Heart Foundation and the Countryside Agency. It aims to encourage local communities at risk from heart disease, such as older people, low income groups, and South Asian families, to exercise regularly. This project explored the use of communication design to motivate and facilitate regular walking.

As part of the Walking The Way To Health team, the researcher worked closely with Walsall Walk On in the West Midlands, a local walking group, and with Keighley Women's Group in West Yorkshire. Outcomes from the study, which looked at user responses to messages about health and well-being, included a set of 'What are you waiting for?' posters placed at bus stops, in doctor's surgeries and by lifts as triggers in the environment to encourage people to walk. Zoned bullseye maps measuring distance as walking time as opposed to miles were also proposed, together with a generic poster campaign to promote greater use of urban green spaces and poster shells to provide local walking groups with a design kit to produce their own communication.



Figure 21: 'Impact wave'. Construction of the patented multi-layer protective fabric.

Stepping stone – designing an inclusive pedometer

In parallel with the development of the promotional campaign, designer Barry Menmuir worked on a low cost step counter for use by participants, especially older people, in the Walking The Way To Health initiative. Regular walking has been described as the 'perfect exercise'. It is free, available to almost everyone, requires no special equipment and has a low impact on joints. It has also assumed a growing importance at a



Figures 22, 23, 24, and 25. Key elements of the 'What are you waiting for?' poster campaign for British Heart Foundation.

national level given Government targets for a healthier nation by 2010. Use of a pedometer supports regular walking by tracking progress and encouraging the setting of new goals. But most step counters on the market are sports gizmos that are difficult to use and have an image that excludes those most at risk from heart disease, such as older people and low-income groups. This project set out to develop a more inclusive, low-cost pedometer for distribution to Walking The Way To Health participants.

The British Heart Foundation set tight cost constraints on the design: the new pedometer needed to be production-ready to meet the deadlines of the national campaign and low-cost at around £5 to be affordable for target users. It also needed to utilise proven

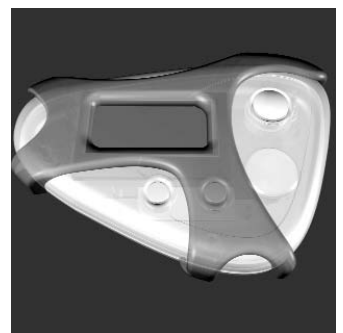
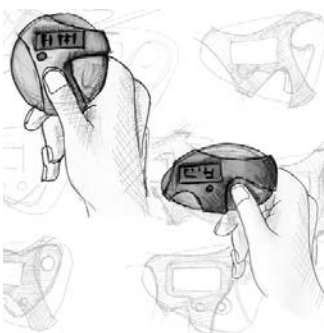
and available technology while taking a new age-friendly approach. The design process was in three stages: an assessment of existing devices with the help of user groups to identify problems; quantitative research among walkers to determine what features were required; and iterative design development informed throughout by user feedback. The resulting design, set for launch during 2002, has one main function button and a clearer display to make it easier to use. Its differentiating aesthetic aims to be desirable to all and an over-sleeve covers extraneous buttons whilst enabling brand customisation.

Power to the people – tools made easier for all

Designer Matthew White undertook a study of potential improvements and new products



Figures 26, 27 and 28. User research for the poster campaign and for the BHF pedometer development project.



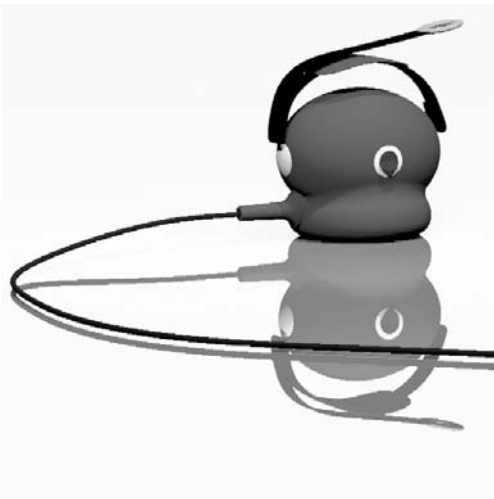
Figures 29, 30 and 31. Developing the pedometer design, from in-use visualisations to models for user testing, and CAD renderings for production costing and exploring the visual language.

for the B&Q power tools range which include the needs of older users and those with reduced grip. Home improvement or Do-It-Yourself (DIY) is a very popular activity, especially among those of retirement age with some time on their hands. But power tools, essential to many basic home improvement tasks, are almost always designed without taking into account the physical impairments that result from ageing.

B&Q is the third largest retailer of home improvement tools and materials in the world and the UK market leader. The company has a high proportion of older customers whom it values highly. This project aimed to review own-brand products within B&Q power tools to make the range more socially inclusive. Concepts developed in partnership with B&Q's supply chain spanned from simple design enhancements to



Figures 32 and 33. User research into hand-tools for DIY with older users.



Figures 34 and 35. The B&Q hand strap palm sander.

completely new products to improve ease of use. The project audited the current range of B&Q power tools against criteria developed from a review of ergonomic studies and user tests. This audit was documented as a quick reference guide for B&Q power tool buyers and own brand manufacturers, and combined with findings from long-term user tests to generate several product concepts.

Four were selected in conjunction with B&Q for development: a compact cordless screwdriver, hand strap palm sander, ergonomic reciprocating/jig saw, and cordless drill weight-saving extension clip. Each concept addressed key 'ease-of-use' factors for each product, such as size, weight, configuration, and visual language. Simple prototypes were made for user testing. Five patents have



Figure 36.
The B&Q ergonomic reciprocating saw.



Figure 37.
The B&Q low-weight cordless drill.

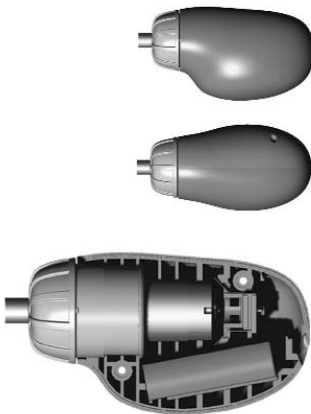


Figure 38.
The B&Q compact cordless screwdriver.



Figure 39.
User research in Tokyo – developing the Happy Travel and Real-Time concepts.

been filed, and once full tests have been completed, the tools will be developed for manufacture with a supplier for sale in B&Q stores.

Real-time travel – navigating the intelligent environment

In partnership with high-tech Japanese manufacturer Omron, designer Nick Rawcliffe undertook a study of the potential for remote sensor technologies to enhance the personal mobility of people of all ages and abilities in city centres. Every journey on public transport is unique. Each individual making the journey has specific needs. Not

everyone has the same physical abilities. Yet the journey information currently available on public transport systems in cities is uncustomised, indiscriminate, and often unreliable. This project set out to investigate the use of 'intelligent' systems to provide accurate, real-time information tailored and delivered to the individual traveller in order to improve personal mobility when travelling in city centres.

User studies were carried out on transport networks in London and Tokyo with observations of a mix of locals and tourists, older and disabled people, children and commuters, providing insights into journey behaviour. Omron sensor technologies capable of being embedded into the built environment (gates, bus stops, barriers etc.) and vehicles (buses, trains, trams etc.) were assessed. As a result, two 'business model' scenarios are proposed for 2005. These describe Omron as running a master system which 'closes the loop' of the journey-making process, integrating transport terminals, networks, users, and destinations. Real-Time Travel, a mobility system for London, does this with the use of an ID Peg which fits on your keyring; a Happy Travel system for Tokyo uses your mobile phone to interact with the intelligent environment.

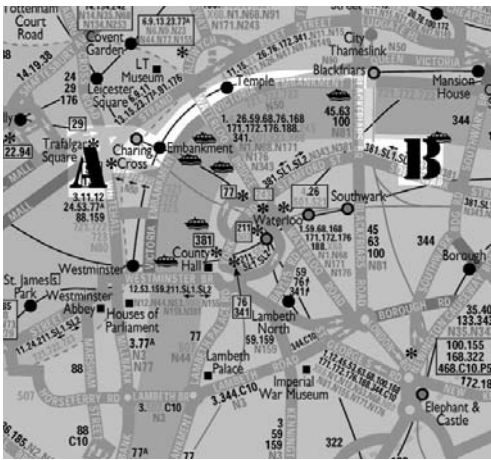


Figure 40. Mapping and understanding individual journeys.

CONCLUSION

This work has developed an 'empathic' design process whereby RCA graduates worked



Figures 41 and 42. Final proposals for London and Tokyo.

with 'critical' user groups – often consisting of older people – to develop 'inclusive' products and services, and to introduce new thinking into companies.

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