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CHAMBERLAIN, Paul <http://orcid.org/0000-0001-6643-3480>, REED, Heath <http://orcid.org/0000-0003-2615-3315>, BURTON, Maria <http://orcid.org/0000-0002-5411-8181> and MOUNTAIN, Gail

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‘FUTURE BATHROOM’… WHAT TO MAKE OR HOW TO MAKE? CHALLENGES IN MEETING SUSTAINABLE NEEDS

Prof. Paul Chamberlain, Heath Reed, Maria Burton, Prof. Gail Mountain.

Prof. Paul Chamberlain, Head of Art & Design Research Centre, Sheffield Hallam University UK
e-mail: p.m.chamberlain@shu.ac.uk

Heath Reed, Senior Researcher, Art & Design Research Centre, Sheffield Hallam University UK
e-mail: heath.reed@dfgroup.co.uk

Maria Burton, Senior Research Fellow, Centre for Health and Social Care Research, Sheffield Hallam University UK
e-mail: M.Burton@shu.ac.uk

Prof. Gail Mountain, Health Services Research (assistive living) University of Sheffield, UK
e-mail: g.a.mountain@shef.ac.uk

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Abstract. This paper is a case study that describes a design research programme, ‘the future bathroom’, undertaken by the authors which illuminates both challenges and solutions for inclusive and sustainable design. A co-design research methodology was adopted and engaged older users and community lay researchers to help overcome the barriers of developing a comprehensive understanding of the issues related to highly personal, private and intimate activities. We adopt the term co-design to describe an approach to design that encourages both user involvement and interdisciplinary design. Our challenge has been to provide an environment where an exchange of ideas between stakeholders could take place and to foster what Manzini (1) has referred to as a ‘creative community’. From the project emerged both insight and understanding of age related disability and bathroom use and potential design solutions to support these needs. Adopting an inclusive approach to design research we have developed flexible, durable and sustainable solutions that meet the diverse and changing needs of bathroom usage The paper discusses how sustainability in the context of inclusive design might need to consider more ‘what we should make’ rather than ‘how we should make’.

1 INTRODUCTION

The bathroom is a space of private and intimate ritual and the research methods for developing an understanding of behaviour has to be carefully considered. A key challenge of this project has been in engaging users in a familiar but what is generally considered 'taboo' subject matter. Chamberlain (2) has previously discussed some of the challenges and barriers to interdisciplinary and user- centred design and this paper will expand on the methods adopted in this study to increase our understanding of age related disabilities and bathroom use and inform design solutions to support independence, dignity and quality of life. The paper introduces an overview of the evolution of traditional approaches to sustainable design and presents a case for how usability and longevity can contribute to more sustainable and inclusive solutions. A brief history of 'the bathroom' will set the context and the project will be described through the user and co-design methods adopted and conclude with an overview of our findings.

Although there has been a move in user-centred design to engage all stakeholders in the production, consumption and disposal of products, designers generally adopt a closer working relationship with industry (the client) where the focus is on 'how to make' rather than the end user where the concern is 'what to make'. Adopting a co-design methodology in this study we have engaged industry (www.ideal-standard.co.uk) but strategically the focus has been the user. Significant in our findings has been the importance of flexibility of use to support unforeseen and changing needs. This presents opportunity for longevity of use and hence more inclusive and sustainable solutions.

2 SUSTAINABILITY - AN EMERGING CONCERN

In the context of industrial design and production there has been extensive discourse on socially responsible design since the early 1970's (3) with a drive to produce products that are less harmful to the environment. However according to Cooper (4), there has been far less debate on how usability, longevity of use and durable consumption can contribute to more sustainable solutions. Discourses centred on sustainability have largely focused on waste and energy reduction in pre and post consumption. A concern for the impact of our consumer society became highly prominent during the 1960's and up until that point consumer durables were generally considered as investments and assumed to last as long as possible. Since then planned obsolescence made prominent by Packard (5), the deliberate curtailment of a products life span, has become commonplace and while there has been increasing consumer criticism of this approach, some academics, including Fishman *et al* (6), have advocated this planned obsolescence as a means of ensuring technological progress. In response to this commercial strategy to production and consumption saw emerging from the radical 1960's the creation of Friends of the Earth (www.foe.co.uk) and Greenpeace (www.greenpeace.org.uk).

In the early 1970's Papanek (3) criticised the design profession for creating products wasteful of environmental resources and submitting to consumerism. He challenged designers to produce more ethical products, low technology for people in developing countries, design for people with disabilities, and products less harmful to the environment. He called for a new design culture based on social responsibility. The public was becoming environmentally aware and in the wake of the Chernobyl disaster (www.chernobyl.org.uk), designers started to

produce environmentally friendly ‘green’ products and the Green consumer guide was published in 1988. Although the earliest documented example of Life Cycle Assessment (LCA) is evidenced in the 1960’s attributed to Coca Cola comparing the impact of a glass bottle and a can, LCA became a key aspect of the eco-design movement in the late 1980’s and early 1990’S (7). LCA has been defined as an investigation and valuation of the environmental impacts of a product or service that is caused by its existence. ‘Sustainable design’ as described by Madge (8) is a broader, long-term vision of eco-design that can mean analysing and changing the systems in which we make, use and dispose of products.

Cooper assesses the potential of increased household product life cycles to accelerate progress towards sustainable consumption and suggests most research touches too lightly upon the implications for product life spans. Increased product life, whether by greater intrinsic durability or ‘product life extension’ through repair, re-use or upgrading which can slow throughput of resources. Product durability was a key theme in an early contribution to the debate on sustainable production and consumption by the World Business Council for Sustainable development (9) which argued that ‘durability is one of the most obvious strategies for reducing waste and increasing material productivity’. McLaren *et al* (10) also describe durability, alongside reuse and recycling, as critical in increasing overall efficiency. Yet Cooper argues ‘the twin themes of product durability and product life extension have attracted relatively little in-depth research’.

Governments actively encourage us to dispose of functioning products and replace with more energy efficient appliances, example cases such as the Energy Star programme in the USA and the UK’s car scrappage programme in 2009. While this might be appropriate in certain cases for particular products the general approach to dispose of functioning goods seems at odds with a sustainable agenda. Cooper suggests it is important to slow down the rate at which materials are transformed into products and subsequently thrown away as waste, a process, which has been described as ‘slow consumption’. Therefore in general there is opinion that longer product life spans lead to less damage to the environment. Products however are not merely functional but can develop relationships with their user. Decisions to discard or to keep a product may be driven by emotion, for example its history. ‘Eternally Yours’ (11) explores peoples attachment to material artefacts and draws parallels with human relationships.

3 THE BATHROOM

Bathing has different functions depending on cultural context and for thousands of years has had religious connotations to cleanse body and soul (12). Communal baths were a popular and a focal point of the community amongst the ancient Greeks and Romans who creatively implemented sophisticated heating and drainage systems. During the middle ages there was a reaction to the hedonism of imperial Rome. Christianity rejected the sinful excessive of personal hygiene instead turning to spiritual cleanliness. There was also a fear that water was a carrier of disease and high society adopted perfumes as alternatives. There is evidence of flushing toilets as early as the sixteenth century but this did not become popular until the explosion of innovations and patents in the mid nineteenth century that coincided with the Great exhibition of 1851. The abundance of ceramic industries, which had emerged through the industrial revolution, began to turn their production to bathroom products which had earlier

been produced in wood and metal. A cholera epidemic that peaked in mid nineteenth century with the Great Stink in London in 1854 finally acknowledged that the disease was transmitted by drinking water contaminated by sewerage. This led to Bazalgette's incredible London sewerage system and Parliament's public health act making it compulsory for every household to have fixed sanitary arrangements (13). The period also coincided with the abolition of the soap tax, which had been a lucrative income for the government since 1622 and ensured soap was affordable to the masses. Controlling water consumption was even a factor during this period and the Metropolitan Water act required water saving measures and the design of the cistern emerged to control the quantity of flushed water. As late as the 1950's many UK households still did not have hot water, bathrooms and only had outside toilets.

The bathroom therefore has established itself firmly in the domestic environment only since the 1960's but there has been no radical change to the general format of the bath, sink and toilet since the mid nineteenth century where ceramic is still the favoured manufacturers choice.

Showers, en suite facilities, spas have seen a significant increase in more recent history. In contemporary society the bathroom is now being promoted as a place where individuals can relax and indulge themselves, as well as being a space in which to undertake necessary functional activities. However, for people with age related impairments such as arthritis, sensory loss, and consequent loss of function, using the bathroom can be a source of difficulties, anxiety, and hazards. Effective design within the bathroom for people with disabilities therefore needs to take account of their aspirations, needs, and capabilities.

The bathroom is not generally a space solely for individual use; it can and is a space for use by family units, those living with disabled people as well as friends and family visiting the home. It thus offers a challenge for inclusive and sustainable design. The solutions we sought in this project are those that alleviate difficulties anxieties and hazards in ways that do not undermine people's self-esteem or restrict other people who may use the bathroom

4. THE PROJECT

The bathroom presents a challenging context for user-centred design. The bathroom format, toilet, bath sink has largely unchanged for the past 150 years. Its 'fixed' nature has restricted consumer change and slowed its evolution. It is likely we might only change our bathroom suite once or twice in a lifetime. In many respects it is a good example of 'slow design' and longevity although unlikely for reasons of emotional attachment. Significant technological innovation has been slow and hence the bathroom less impacted by obsolescence and the need for change. However the barriers to change and innovation in bathroom products have meant users make do with inadequate facilities which can present many challenges in later life. The bathroom is full of contradictions. It can be a place of intimacy and privacy, comfort and danger, fun and fear. It is a place where we can relax and be alone, one of the few places we can lock ourselves away but it is a place we can be highly vulnerable. Likely to be naked, challenged with vision (for spectacle users) and hearing (acoustics) in an environment with hard, slippery cold surfaces. It is a confined space where many physical challenges must be

addressed but it is important to consider the emotional and sensory aspects of users engagement and interaction.

Our aim was to consider the needs of age related disability and bathroom use and apply this understanding to inform the design of bathroom products that were not specifically designed for older users but were inclusive, in that they met diverse user requirements and changing needs through life course and did not stigmatise as 'special equipment'. Hence while it was important to engage older people in the research we acknowledged aspirations of the future old may be different to those who had experience of tin baths and outside toilets which may contribute to a 'make do' approach. Additionally we recognized solutions would have to consider the fact that it is projected that two thirds of all housing stock in the UK is likely to exist in 2050 (www.communities.gov.uk) and as such solutions would likely be retro fit rather than new build.

4.1 Method and approach

The research team consisted of practiced base design researchers, experts in health (physio and ageing) from Lab4Living (an interdisciplinary research collaboration at SHU), Ideal Standard a major supplier of bathroom products, end users and carers.

Establishing the status of older participants in our research was key. In a co-design methodological approach we positioned the older users as 'expert users' that would inform the design of the future bathroom with a focus on physical needs. To broaden the demographic and address broader issues other methods were adopted. In an approach to research and design 'with' users, rather than 'for' users', older community lay researcher were employed as researchers on the project from a network of voluntary participants. Due to the sensitivities of discussing personal details and habits it was recognised that there could be barriers to obtaining detailed information about bathroom use. Therefore the rationale for involving older people as data collectors was to overcome this challenge. It was considered that those of a similar age with local understanding would have more empathy with those who had volunteered to be interviewed and encourage more open discussion about bathroom use. Further background to 'bathroom disability' and a more detailed description of our user engagement has been previously been published by the authors (14).

From 73 expressions of interest (51 female, 22 male over the age of 50) and following ethical approval, volunteers were involved in focus groups to discuss their 'likes' and 'dislikes' about their bathroom. 11 from the focus groups volunteered to be lay researchers (figure 1) and took part in a two separate one day training sessions and equipped with probe packs, containing such things as a checklist, pro-forma 'data' collection sheets, measuring, sketching and recording materials, a camera, for photographing the bathroom, a dictaphone for recording interviews and a mobile phone. Additionally a pack was also assembled for use by the interviewee that included a disposable camera, a bathroom use diary, a notebook and a stamped addressed envelope for return of data to the University. Over a three month period the lay researchers conducted 23 home visits collecting rich descriptions of the positive and negatives of the bathroom. The data was analysed individually by the project team and findings shared together. Differing disciplinary approaches and handling of the data was reflected upon but the emergent themes were consistent and shared with the lay researchers. The aim was to explore

the level of consensus and potential differences in interpretation of the data between the project team and the older people.

Figure 1. Stakeholder workshop and lay researcher data capture

Key themes that emerged were as follows;

- Contrasting opinions of the bathroom, 'luxury' and 'utility'
- Concerns about safety. Often a fear of what might happen rather than accidents that had occurred
- Bathroom furniture being the wrong shape and/or size and in the wrong place causing access problems
- Lack of space. Although small space was often reported in a negative way, close proximity of bathroom furniture often provided a sense of security
- Anticipation of future needs and subsequent economic considerations
- Seeking solutions to bathroom problems. Interviews often presented exchange of ideas of how people had approached and implemented solutions

The data was further analysed by the project team, commonalities identified across the data sets leading to three main themes of enquiry.

1. An adaptable bathroom – emerging from issues that indicated the need for the bathroom to be more flexible and adaptable rather than the addition of extra assistive technology
2. Safety – overcoming fear factor often in relation to declining vision, hearing, balance and strength
3. Sustainability – solutions that are financially and ecologically sound in both in the use of water and energy and also in terms of durability and longevity of use (also embedded in 1 above)

The above could be embraced in a generic inclusive and sustainable approach to design both through our process and solutions. To broaden the demographic and cultural insight numerous methods and techniques were implemented in parallel to the core methodological approach.

These included paper surveys, online blogs, an interactive public field lab/exhibition, physical testing (motion capture) and design workshops with students in the UK, Turkey and Taiwan. Each yielded often limited but highly specific insights that contributed to the data collection.

4.2 'Design' and development

Design is generally assumed to be solely a problem solving activity that is used at the end of the development process to embellish a product The design members of the project have a track record of utlising design and the creation of artefacts as research tools to aid communication and develop greater understanding of users emotional and physical relationship with objects (15). In response to the themes a series of designs and artefacts were created to prompt further dialogue and not necessarily developed as considered viable solutions. Sketches, CAD models, mockups and video scenarios were produced to clarify, confirm, provoke and present 'what if scenarios' as 'critical artefacts'. This approach helped overcome preconceptions, prejudices and disciplinary jargon.

A one-day symposium was held at the University where the project team invited the expert advisors appointed to the project (from architecture, disabled living, assistive technology), our volunteer users and carers , lay researchers and industrial representatives to discuss approaches, findings prompted by the 'critical artifacts'. A series of half-day R&D workshops followed, directed by the design members of the project team and including the lay researchers and was used to further develop concepts in response to the three established themes. Further iterations and development of concepts, prototypes in a physical bathroom space created in our lab led to a further round of appraisal with volunteer users, our external advisory team and industry.

4.1 Conclusion

The three-year project demonstrates through this case study an interdisciplinary approach to research and a user-centered co-design methodology where end-users have been significantly engaged throughout the research programme. Older users have been empowered with a significant level of responsibility and respect and viewed as 'experts' in a research environment where we have been able to foster a co-design dialogue between designers, health researchers and older people with age related disability. Developing 'with' and not just 'for' older users we have created guidelines, product design iterations and innovative new product (unable currently to disclose in detail) that provides flexible solutions to aid the complex variety of user needs throughout life course with particular attention to addressing the challenges faced by older users and those with age related disability. Through flexible solutions that meet changing needs of use and upgrades, usability and inclusivity can be enhanced to extend longevity and provide more sustainable product solutions.

Prototype designs while favorably received require further iteration, design detailing and production, we also recognize there are still significant barriers to overcome before a clear strategic route to market can be established. Although there are signs of change, the bathroom industry has been entrenched in particular materials and methods of production. New innovation such as toilet flushes or waterless toilets are driven by a sustainable agenda based on energy resource pre and post consumption rather than usability and longevity. If we are to develop and create more appropriate inclusive products through a user-centred co-design

approach we must think more holistically and intelligently in the context of sustainability and strike a balance between 'what we make' and its usefulness, and not just 'how we should make things'

REFERENCES

[1] E. Manzini, *Creative Communities and the Diffused Social Enterprise.* Schumacher Lecture Series, Leeds Metropolitan University, UK. November 2006.

[2] P. Chamberlain, Horses, Elephants and Camels….*barriers to user-centred design research*. (Design Society) Conference proceedings 11th International Design Conference– DESIGN 2010, Dubrovnik, Croatia. 2010

[3] V. Papanek, *Design for the real world*: *human ecology and social change*. London: Thames and Hudson ISBN 9780500273586. 1971.

[4] T. Cooper, *Slower Consumption, reflections on product life spans and the 'throwaway society'.* Journal of industrial Ecology volume 9, Issue 1-2 pages 51-67 Jan 2005

[5] V.Packard, *The Waste Makers*, Harmondsworth: Pelican 1960

[6] A. Fishman, N. Gandal, O. Shy. *Planned obsolescence as an engine of technological progress.* Journal of Industrial Economics. XL1 pp 361-370. 1993

[7] T. Allen, *Life cycle tools for sustainable change.* Pro design Issue 96. P52-54. 2008

[8] P. Madge, *Ecological design: a new critique*. Design Issues Vol 13 (2), p 52. 1997

[9] E.G. Falkman, *Sustainable Production and Consumption*, Geneva: World Business Council for Sustainable development. 1996

[10] D. McLaren, S. Bullock, N. Yousuf, Tomorrow's World London Earthscan. 1998

[11] V. Hinte, (ed) *Eternally Yours': Visions on Product Endurance. 010, Rotterdam 19*

[12] V. Smith, *Clean, a history of personal hygiene and purity*. Oxford university press ISBN 978-0-19-929779-5. 2007.

[13] D.H.Porter, *The Great Stink of London, Sir Joseph Bazalgette and the cleansing of the Victorian Metropolis*. Victorian Studies Volume 43 Number 3, ISSN 0042-5222. 2001.

[14] M. Burton, H. Reed, P. Chamberlain, G. Mountain, *Age-Related Disability and Bathroom Use*. Journal of Integrated Care, Volume 19, Issue 1, Edited by Peter Thistlewaite, Published by Pier Professional. Feb 201. ISBN 1476-9018. 2011

[15] P. Chamberlain, J. Roddis, *'Making sense'*, The Design Journal, Volume 6, issue 1, Ashgate Publications Ltd. England. ISBN 0-7546-0910. 2003