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Methods and challenges in designing an innovative wheelchair stability assessment system

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This paper describes the design methods employed in the development of a complex health product - Wheelsense® (illustrated in Fig 1). Wheelchair stability and performance is an important consideration for the growing number of wheelchair users in the UK [(Sapey *et al*, 2004; NHS, 2004)Not only should users feel safe when static in their chair, they should be able to move around their environment, and engage confidently in daily activities with a clear understanding of the capabilities and performance of their wheelchair (Cooper, 1998).

Figure 1 Wheelsense

This paper describes the design process that has underpinned the development of Wheelsense®, a tool for guiding the modification of wheelchairs to suit the needs, wants and lifestyles of their users. Wheelsense® is a computer-based system incorporating force-measurement technology within a custom made rig. It calculates the centre of gravity, and maps the stability points of the user-wheelchair system. It combines aesthetic design with mathematical modelling, a measurement platform and a graphical user interface.

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The resulting system is complex in terms of the engineering involved, but the development approach aimed to be inter-disciplinary, user-centred and involve co-design activities. The range of design approaches and methods used during the highly interdisciplinary project are detailed along with the challenges of designing within this healthcare context. Some of the challenges that will be discussed include project planning for co-creation activities; ethics in healthcare design research; governance requirements; clinical evaluation and managing stakeholder expectations.

Cooper RA, Wheelchair selection and configuration, 1998, New York. Demos Medical Publishing, Inc.

NHS MA, Improving Services for Wheelchair Users and Carers. Good Practice Guide, 2004

Sapey B, Stewart J, Donaldson G The social implications of increases in wheelchair use. Report. Department of Applied Social Science Lancaster University, 2004. http://www. lancs. ac.uk/fss/apsocsci/wheelchair/the% 20social% 20implications% 20o f% 20increases% 20in% 20wheelchair% 20use. pdf.

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