

L. Normie. *Multicriteria design optimisation of accessible products for the ageing population*. *Gerontechnology* 2008; 7(2):175. Computational multicriteria design optimisation (MDO) techniques have been successfully employed in the aerospace, automotive, and process industries since the mid 1980s and, more recently, also applied to the design of consumer appliances¹. There exists considerable potential for MDO to facilitate the development of mainstream durable consumer products which are matched optimally to the physical, sensory and cognitive capabilities of older people². However, application of MDO techniques in the gerontechnological domain is not reported in the scientific literature. This paper describes a conceptual framework for how such applications might be achieved. The goal of computational design optimisation is to minimise (or maximise) the numerical value of an 'objective function' - an expression of the system (product) design variables, subject to various design constraints and fixed parameters³. The objective function therefore represents a measure of the desired performance attributes of the system. Design optimisation problems typically involve several, usually conflicting, design criteria that must be satisfied simultaneously (multi-objective). Moreover, design objectives in the same problem may be grounded in several different engineering disciplines, involving the harmonisation of noncommensurate units (multidisciplinary). We have developed a prescriptive scheme for the specification of suitable objective functions and computational optimisation solution procedures, within both multi-objective and multidisciplinary contexts, that may be applied to the design of accessible and inclusive products which address, optimally, the requirements of older people. **Methods** A hierarchically structured combinatorial objective function, comprising an appropriately weighted linear sum of single-criteria objective functions⁴, is formulated in terms of product design variables affecting usability and solved within a model framework of ADL/IADL performance scales and anthropometric population constraints⁵. Candidate solutions of the objective function in design variable space are found by analytical⁶ and stochastic⁷ optimisation techniques, as well as through a synthesis of both approaches⁸. **Results and discussion** A computational scheme for specifying and numerically solving a combinatorial objective function of optimal user accessibility in product design has been conceptualised within a framework of anthropometric physical, sensory, and cognitive user attributes mapped to system design variables. The objective function is decomposable and hierarchical in form thereby extensible to an arbitrary number of system design variables and usability constraints. The resulting optimised design figure-of-merit can be operationalised as IADL minimum performance measures.

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Address: GeronTech, Israel; E: lnormie@gerontech.org.il