Editorial

Ana Tajadura-Jiménez

UCL Interaction Centre (UCLIC),
University College London,
Malet Place Engineering Building,
8th floor Gower Street, London WC1E 6BT, UK
E-mail: a.tajadura@ucl.ac.uk

Marco Ajovalasit and Joseph Giacomin*

Human Centred Design Institute,
Brunel University,
Uxbridge, Middlesex, UB83PH, UK
E-mail: marco.ajovalasit@brunel.ac.uk
E-mail: joseph.giacomin@brunel.ac.uk
*Corresponding author

In the English language, the word 'design' is highly versatile and takes on a variety of noun and verb meanings. In its noun form, standard dictionaries suggest elements of definition which involve the concepts of sketch, drawing, plan, pattern, intention or purpose, or the art of producing them. In its verb form, the same dictionaries suggest the representing of an artefact, system or society, or the fixing of its look or function, or the fixing of its goals and purposes. The word 'design' therefore has meanings ranging from the abstract conception of something to the actual plans and processes required to achieve it. Because the word 'design' can be used to express the intention or purpose, as opposed to the actual materials, forms, processes and markets that it involves, it is often used to describe the driving force of the creative thought itself.

In recent years, businesses have shifted their design emphasis away from matters of pure technology and manufacture, moving instead towards a growing preoccupation with how the products, systems or services are perceived and experienced by the consumer. This observation is supported by numerous studies, including the work of Eric Von Hippel of the MIT Business School, who has noted that large scale statistical evidence demonstrates that "70% to 80% of new product development that fails does so not for lack of advanced technology, but because of a failure to understand users' needs."

A growing abundance of sophisticated and relatively low cost technologies have shifted the focus away from the physical aspects of design to the metaphysical aspects. Well-known brands such as Alessi, Armani, Apple, Facebook, Ferrari, Google, IKEA, Nokia, Phillips and Virgin have led the way. Choosing and rescaling technologies to fit people's needs has been the trick in many cases, such as Apple, while focusing on emotional engagement has made companies like Alessi a household name.

The shift towards emotional engagement and meaning is evident in the progression of paradigms that have prospered over the decades, starting with ergonomics and moving through human factors, usability, user-centred design, inclusive design, interaction

design, design for product experience, design for customer experience, design for emotion, emotionally durable design, sensory branding, neurobranding, service design and finally, most recently, the umbrella paradigm of human-centred design. What began as the psychological study of human beings on a scientific basis for the purposes of machine design has evolved to become the measurement and modelling of how people interact with the world, what they perceive and experience, and what meanings they create.

Human-centred design leads to products, systems and services that are physically, perceptually, cognitively and emotionally intuitive. It is based on the use of techniques that communicate, interact, empathise and stimulate the people involved, obtaining an understanding of their needs, desires and experiences, which often transcends that which the people themselves actually knew and realised. The toolbox of human-centred design techniques grows continuously, sometimes by borrowing from fields such as psychology or sociology, and sometimes instead by defining new analogies and approaches. Regardless of the specialist application or of the contextual conditions involved, however, scientific knowledge about the perceptual, cognitive and emotional characteristics of humans is always, everywhere, present when performing human-centred design.

As a business sector with more than 100 years of success from technological innovation, the automotive industry is characterised by highly efficient technological R&D structures and initiatives. Far less understood and developed are, instead, the human-centred R&D structures and initiatives. Whereas agreement exists in many technological areas regarding appropriate research challenges and research methods, there is far less consensus regarding the human-centred design areas in greatest need of research and development. No major automotive sector company currently operates along the lines of an Apple Inc. or of an Alessi Spa business model. Human-centred automotive design methodologies are thus urgently needed in the areas of co-design with the customers, iconic interior touchpoints, perception enhancement, tailored sound and vibration emissions (particularly for hybrids and electrical automobiles), gamification of the automobile driving experience and for developing a coherent emotional response of the automobile as an intelligent entity.

Underlying each critical human-centred design area is, however, a need for high quality scientific knowledge regarding the perceptual, cognitive and emotional responses of people. This special issue of *IJVNV* provides a small step forward in the scientific understanding of the complexities of the human emotional response to sound and vibration stimuli in automobiles. It contains research contributions ranging from people's emotional response to steering wheel vibration to people's emotional response to men's and women's voices used by the in-car navigation system. Experiments and analysis described in this special issue include research to correlate human emotional responses to general scientific measures of the in-car auditory environment, and specific practical correlations determined for a specific Bentley automobile. The thorny issue of how sound and vibration combine, or subtract, in a person's mind when applied simultaneously by the in-car environment is also addressed in more than one of the studies reported here.

Taken as a whole, this special issue provides a useful overview of the possible human emotional responses to combined sound and vibration in automobiles, and a penetrating look at some of the psychophysical, cognitive and emotional issues involved. Such scientific knowledge is the bedrock of efforts to work with customers to achieve human-centred automobiles, and as such provides an important starting point, and an

important set of research questions that need to be pursued. It is the heartfelt hope of the group of editors of this special issue that the set of papers will make interesting reading, will cause some curiosity and doubts, and will act to stimulate additional efforts to design automobiles that 'fit' the driver as well as an Armani suit.