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# Dialogue Appropriate to Assistive Technology Product Design: A Taxonomy of Communication Formats in Relation to Modes of Sensory Perception

**Abstract** This article reviews the use of dialogue and associated communication formats within the context of participatory or co-design decision-making processes in the development of assistive technologies. My professional experience as a designer, researcher, and educator suggested the dialogue among the designer, end-user, and associated stakeholders is critical to effective and economic product development. The research I report on here is a systematic analysis of that understanding. First, I conducted a literature review which established that there was no standard meaning for the term "dialogue." The literature review highlighted the challenges of reduced options for communication through the compounding constraints of culture, language, and impairment. I then conducted a summative content analysis on twenty case studies to identify and define the terminology and points to consider in collaborative dialogue between designers and people who need assistive technologies. This analysis led to the development of a taxonomy of communication formats matched to specific sensory inputs and these have been structured to work as a heuristic design tool. Of the forty-one formats defined, around two-thirds were used in the literature reviewed. Notably, more than half the studies used just over a quarter of the formats. The definitions of dialogue and the design heuristics I put forward in this paper require further debate and refinement to be effective to wider applications.

**Keywords**
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## Introduction

I have been an industrial designer for nearly thirty years and most of that time has been spent in the field of assistive technology product design. This is a product area that makes a substantial contribution to the economy. In the United Kingdom, the Institute of Export and International Trade states that, "The social care market, dominated by assistive technologies and private care homes, is set to grow from £2bn in 2012 to £6bn in 2020 due to the demand for delivery of care closer to home."[1] Globally, more than one billion people need at least one assistive product.[2]

The World Health Organization defines this field to include assistive products, services, and systems related to the delivery of these products and services. This paper is situated in the area of assistive technology products. These are products that maintain or improve the function and independence of individuals who use them to enhance their well-being. Examples of assistive technology products include hearing aids, wheelchairs, communication aids, spectacles, prostheses, pill organizers, and memory aids.

As a practicing designer, researcher, and design educator, I have used and taught participatory design methods. One important element of this method is that dialogue among the designer, end-user, and associated stakeholders is critical to effective and economic product development.[3] Participatory design, as a method of generating physical products or services, is used in disciplines from sports coaching to business and social policy.[4] I argue that this method would be enhanced if designers used communication formats that match the sensory input of the individuals with whom they are working.

In this article, formats of communication refer to: spoken word, music, or audible sounds; acting out an activity (role play) and movement; two dimensional visualizations such as line drawings and photo-realistic images; and, three-dimensional models, from simple esquisse or sketch models made from cardboard or foam to fully working prototypes. Industrial designers often use a combination of these communication formats during a design process – a choice based on personal experience rather than research.

What is missing, in existing literature, is research regarding the appropriate communication formats for various contexts. This article clarifies the contexts in which different types of communication formats are used in the design process. It presents a taxonomy of communication formats matched to particular sensory inputs; structured to work as a heuristic design tool. The research question addressed in this article is: What are the appropriate communication formats to apply to dialogue as part of a user-centered, participatory approach to assistive technology product development?

## Definition of Terms

Reviewing conventional formats for industrial design requires a definition of the practicing designer. I formulate the concept in this way: an industrial designer contributes to social and cultural function or value by embedding cultural coding in a product or service and manipulating viewers' or users' perceptions of it within the constraints of cost and time. Practicing industrial designers are often paid for their time on an hourly rate or predict the time it will take to do a specific job and quote a 'flat rate' for the work. In either case, there is a finite time a client would wish to pay for research or exploration of options before receiving a definitive outcome. Assistive technology product design is part of industrial design. Assistive technology design focuses on the providing products (predominantly) used to increase, maintain, or improve the functional capabilities of individuals with one or more disabilities.[5]

1 The Institute of Export & International Trade, "Unlock Your Global Business Potential: UK Medical Technology," Accessed December 11, 2017, https://opentoexport.com/article/unlock-your-global-business-potential-uk-medical-technology/.

2 "Assistive Technology," World Health Organization, accessed December 10, 2017, http://www.who.int/mediacentere/factsheets/assistive-technology/en/.

3 Nigel Cross, *Design Participation* (London: Academy, 1972), 11–14; Geof Mercer, "Emancipatory Disability Research," in *Disability Studies Today*, ed. Colin Barnes, M. Oliver, and L. Barton, (Oxford: Blackwell, 2002), 228; Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (Farnham: Ashgate, 1991), 76; Donald A. Schön, *The Design Studio: An Exploration of its Traditions and Potential* (London: RIBA, 1985), 1–8.

4 Sid Hayes and Gary Stidder, *Equity and Inclusion in Physical Education and Sport* (Abingdon: Routledge, 2003), 1; Bjirn Gustavsen and Per H. Engelstad, "The Design of Conferences and the Evolving Role of Democratic Dialogue in Changing Working Life," *Human Relations* 39, no. 2 (1986): 101; John S. Dryzek and Carolyn M. Hendriks, "Fostering Deliberation in the Forum and Beyond," in *The Argumentative Turn Revisited: Public Policy as Communicative Practice*, ed. Frank Fischer and Herbert Gottweis (London: Duke University, 2012), 31.

5 World Health Organization, "WHO Global Disability Action Plan 2014–2021: Better Health for All People with Disability," accessed December 11, 2017, http://apps.who.int/iris/bitstream/10665/199544/1/9789241509619_eng.pdf.