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What is Human Centred Design?

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Abstract

Reflections upon the meaning of the word “design” are made and a relatively complete definition of the paradigm of human centred design is formulated. Aspects of both the background and the current practice of the paradigm are presented, as is a basic structural model of the design questions addressed. Evidence is provided of the economic benefit of human centred design in business settings as an approach for designing products, systems and services which are physically, perceptually, cognitively and emotionally intuitive. Evidence is further presented of the coherence of the paradigm with the logic and structure of several currently popular marketing and banding frameworks. Finally, some strategic implications of adopting human centred design as a business strategy are introduced.

Keywords: people; human centred design; design; marketing; branding; strategy; innovation and business.

Design

In the English language the word “design” takes on a variety of noun and verb meanings. In its noun form, standard dictionaries suggest concepts of sketch, drawing, plan, pattern, intention or purpose, or the art of producing them. In its verb form the same dictionaries suggest elements of definition involving representing an artefact, system or society, or the fixing of its look, function or purpose. The word “design” therefore has meanings ranging from the abstract conception of something to the actual plans and processes required to achieve it. The concept of design as a way of making sense of things has been the subject of many studies (Krippendorff 1989) as has the design thinking process itself (Brown 2008 ; Brown 2009).

Since “design” can be used to express intention as opposed to the actual materials, forms, processes and markets, it is often used to describe the driving force of the creative thought itself. In this usage the word “design” assumes a role similar to that of postmodern

discourse, as defined by Foucault and others (Butler 2002; Foucault 2010), thus it refers to language which is absorbed and exchanged between people, providing the basic units of meaning. In this usage "design" can signify the shaping power described in philosophical analysis by terms such as "thought processing" (Heim 1993) and "instrumental realism" (Ihde 1991; Ihde 1998) or in applied linguistics by terms such as "professional vision" (Goodwin 1994).

When attempting to characterise the major movements which operate within the world of design today, three in particular seem to each be characterised by specific discourses and values (see Figure 1) and to be practiced by large numbers of designers and other professionals. Technology driven design, sustainable design and human centred design are major movements which usually lead to distinguishably different results despite operating within the same legal, regulatory, contextual and economic constraints. The different core discourses based on technical novelty, planetary impact or human meaning lead to notable differences in the resulting product, system or service.

Figure 1) Three major design paradigms.

Human Centred Design

Human centred design has its roots in semi-scientific fields such as ergonomics, computer science and artificial intelligence. The echoes of this past can be noted in international standards such as ISO 9241-210 "Ergonomics of human-centred system interaction" which describes human centred design as "an approach to systems design and development that aims to make interactive systems more usable by focusing on the use of the system and applying human factors/ergonomics and usability knowledge and techniques". ISO 9241-210 specifically recommends six characteristics:

- The adoption of multidisciplinary skills and perspectives
- Explicit understanding of users, tasks and environments
- User-centred evaluation driven/refined design
- Consideration of the whole user experience
- Involvement of users throughout design and development

- Iterative process.

Such engineering based approaches address well the needs of the users of tools since tools have predetermined functions. The difficulty in the case of consumer products, systems and services is that the customer does not always adopt the point of view of a “user” of a “tool”. As Susan Gasson has highlighted “user-centred system development methods fail to promote human interests because of a goal-directed focus on the closure of predetermined, technical, problems”. Designing for a “user” usually involves optimising the characteristics of the product, system or service based on a set of fixed preconceived cognitive plans and schema. Such a view leads to designs which are efficient towards one or more predetermined usage patterns (Degani 2004) but which are often characterised by only limited degrees of interactivity, exploration and learning.

Fixed preconceived cognitive plans and schema have been identified as a significant weakness by Lucy Suchman, who has researched the situatedness of human interactions with products, systems and services. Suchman (2007) has noted that “the coherence of action is not adequately explained by either cognitive schema or institutionalised social norms. Rather, the organization of situated action is an emergent property of the moment-by-moment interactions between actors, and between actors and the environments of their action.” According to this view, interactions and meanings are the result of a process of communication and learning which cannot be fully defined or anticipated within the original physical, perceptual and cognitive objectives of the design.

The use of “personas” and “scenarios” as a basis for design can provide greater opportunities for facilitating interaction, imagination and learning (Carroll 2000 ; Mulder and Yaar 2006). Determining design requirements and defining design concepts based on what is known about the people involved, and what is known about the environment in which the interaction takes place, can help widen the affordances for interaction, play and learning. Further, specifically targeting emotional engagement (Jordan 2000 ; Norman 2005 ; Chapman 2005 ; Oatley et al. 2006 ; Cohan and Allen 2007 ; Kamvar and Harris 2009 ; Hill 2010) during the design process can lead to even more elaborate interaction opportunities.

Krippendorff (1989, 2004) has raised the bar further though his view that “I call human-centred an approach to design and research that takes seriously the proposition that behaviour and understanding go hand-in-glove, that the use of artefacts is inseparable from how users conceive of them and engage with them in their world. Let me state the proposition more concisely: humans do not respond to the physical qualities of things but to what they mean to them.” The implication of Krippendorff’s view is that the heart of any design activity is the identification of the meaning which the product, system or service should offer to people. Such a view suggests that design activity should concentrate first and foremost on questions of motivation, discourse and learning before proceeding to identify the means of implementation. The definition of human centred design presented in this conference paper is fully consistent with Krippendorff’s view of a multidisciplinary activity which has as its ultimate goal the clarification of purpose and meaning, and is fully consistent with the assertion that design itself is a pragmatic and empirical approach for making sense of the world around us.

Today’s human centred design is based on the use of techniques which 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 realised. Practised in its most basic form, human centred design leads to products, systems and services which are physically, perceptually, cognitively and emotionally intuitive. Such elementary application of human centred design is consistent with the definition proposed by Norman and Verganti (2011) which limits interactions within existing semantic and cognitive frameworks. Interacting with stakeholders from within the boundaries of existing products, systems, services and meanings leads naturally to incremental innovation of some degree. Design examples which illustrate such intuitive outcomes are presented in Figures 2 to 5.

Figure 2) Example of a physically intuitive design: “Cosy All The Time” by Sam Weller is an energy-efficient heater built into a sealed pocket within a blanket, which is recharged by placing it over a clothes horse induction unit. Its heating and charging functions are simple and physically obvious.

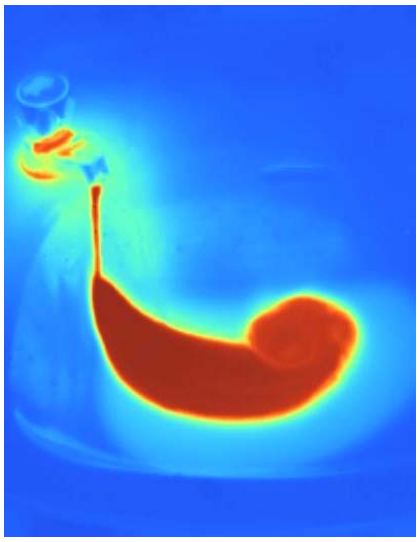

Figure 3) Example of a perceptually intuitive design: “Energy Sixth Sense” by Joseph Giacomin utilises thermal imaging to provide feedback in home heating thermostats, rendering the thermal situation of the room perceptually obvious.

Figure 4) Example of a cognitively intuitive design: “Bathe Safe” by Oliver Wooderson utilises a large colour screen to monitor bath temperature to avoid the dangers of scalding. Colours, typography and visuals combine to render the situation cognitively obvious.

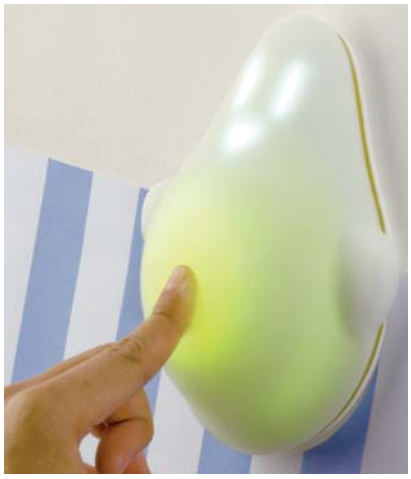

Figure 5) Example of an emotionally intuitive design: “Tio” by Tim Holley is a light switch which encourages children to reduce energy usage. Its expressive use of coloured light and images as feedback makes the emotional state of the switch obvious.

The elementary application of human centred design does not, however, completely describe the design processes behind many of today’s most successful products, systems and services. In the 21st century a growing abundance of sophisticated and relatively low cost technologies has shifted the focus away from physical considerations towards instead metaphysical considerations. 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 and new meanings has instead been instrumental in making companies such as Alessi a household name.

This shift in emphasis is evident in the progression of design paradigms which have evolved and prospered over the years starting with ergonomics and moving through human factors, usability, user centred design, inclusivity, interaction design, empathic 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 (Meister, 1999) for purposes of machine design has evolved to become the measurement and modelling of how people interact (Moggridge 2007) with the world, what they perceive and experience, and what meanings (Csikszentmihalyi and Rochberg-Halton 1981 ; Krippendorff 1989 ; Krippendorff 2004) they create.

The most successful examples of 21st century human centred design practice are probably best described as processes which answer an incremental set of questions regarding the relationships which are established between the design artefact and the people. One simple representation of such a scheme is the human centred design pyramid of Figure 6 in which the classical rhetorical questions of antiquity of Quis (who), Quid (what), Quando (when), Quem ad Modum (in what way) and Cur (why) have been associated with current design semantics to structure the growing layers of complexity. This interpretation of human centred design is based on a hierarchy which has at its base the scientific facts about human physical, perceptual, cognitive and emotional characteristics, followed by progressively more complex, interactive and sociological considerations. At its apex the model contains the metaphysical meaning which individuals form based on contact with the design. In the view which is summarised by the model the metaphysical meaning, whether pre-existing or still to be created through contact, is considered the key to social acceptance, commercial success, brand identity and business strategy.

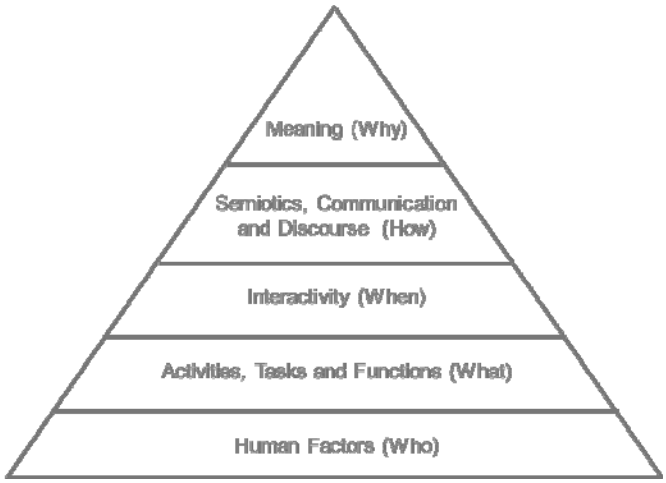

Figure 6) The human centred design pyramid.

As summarised by the model, human centred design consists of a series of questions and answers which span the spectrum from the physical nature of people's interaction with product, system and service to the metaphysical. Designs whose characteristics answer questions and curiosities which are further up the pyramid would be expected to offer a wider range of affordances to people, and to embed themselves deeper within people's minds and everyday lives. In particular, a product, system or service which can introduce a new meaning into a person's life would be expected to offer ample opportunities for commercial success and for brand development, as historic examples such as Ferrari sports cars or Apple Ipods seem to suggest.

The model of human centred design proposed here is not consistent with the definition proposed by Norman and Verganti (2011) which limits interactions within existing

semantic and cognitive frameworks. Interacting and empathising with stakeholders from within the boundaries of existing products, systems, services and meanings leads naturally to incremental innovation of some degree. The model of human centred design proposed here is instead consistent with the definitions and examples of design provided by Pullin (2009), which accepts the need for problem solving but which emphasises instead openness of mind, the challenging of existing constraints and efforts to influence and possibly change behaviours and social structures.

The model proposed here takes the wider view that meanings can either be adopted from existing practice as in the case of incremental innovation or defined ex-novo based on new observations and ideas which arise from interactions with people. While marketers and designers are familiar with the "wall" which is often faced when discussing revolutionary new concepts with members of the general public, new ideas, new concepts and new designs are nevertheless routinely achieved in practice through judicious use of interaction tools. It is the author's postion that disruptive innnovation is as natural an outcome of human centred design as is incremental innovation.

The model proposed here does not directly articulate a set of individual design questions due to the situatedness of human centred design, which must of necessity ask questions which are specific to the individuals involved and to the target environment (Giacomin 2009). Nevertheless, the model does identify a hierarchy of questions and issues which starts with the physical, perceptual, cognitive and interactive affordances of the human body and ends with the ultimate meanings which the product, system or service will either occupy or create within the psychological, sociological and societal space of the individual.

Human Centred Design Tools

Today's human centred designer is a relatively transparent figure who does not impose preferences on a project, but who instead stimulates, conveys and translates the will of the people. The toolbox of human centred design techniques grows continuously, sometimes by borrowing from fields such as psychology or sociology (Berg 2001), and sometimes instead by defining new approaches which emerge from design practice. Card decks such as those by IDEO (IDEO 2003) and PLEX (Lucero and Arrasvuori 2010) and design texts such as those of Jordan (2000), Norman (2005), Mulder and Yaar (2006), Schifferstein and Hekkert (2007), Dunne (2008) and Van Gorp (2012) are routinely deployed by human centred designers.

Human centred design tools can be classified based on their intended use. The most basic form of tool consists of facts about people such as anthropometric, biomechanical, cognitive, emotional, psychophysical, psychological and sociological data and models. Such items of information, which are often treated as matters of ergonomics or human factors, provide basic factual statements regarding the abilities and limitations of humans. Such tools define the boundaries within which to operate, and usually act more to inform the human centred design process than to drive it.

Some human centred design tools consist instead of methodologies and techniques for interacting with people in such a manner as to facilitate the detection of meanings, desires and needs, either by verbal or non-verbal means. Cognitively inspired language-based techniques such as ethnographic interviews (Spradley 1979), questionnaires, role playing

and focus groups (Stewart et al. 2007) tend to dominate this category historically. A growing number of methods are, however, used to investigate those areas of human mental activity which are not always directly accessible to conscious thought. Participant observation (Spradley 1980), body language analysis (Navarro 2008 ; Wharton 2009), facial coding analysis (Hill 2010), electroencephalograms (Du Plessis 2011) and other approaches for measuring and analysing non-verbal information are being increasingly adopted by marketers and designers.

Finally, a growing set of human centred design tools are used for simulating intuitions, opportunities and possible futures for purposes of emersion, reflection and discussion. From the currently popular approach of co-design (Von Hippel 2005) to the more speculative techniques such as real fictions and para-functional prototypes (Dunne 2008), new approaches are being developed and deployed which immerse people in one or more possible futures, providing opportunities for socially experimenting the envisaged product, system or service.

A partial list of some of the tools which are most frequently deployed by human centred designers includes:

Facts Regarding Humans and Society

- Anthropometric data sets and models
- Biomechanical data sets and models
- Psychophysical data sets and models
- Cognitive data sets and models
- Emotional data sets and models
- Psychological data sets and models
- Sociological data sets and models
- Philosophical data sets and models

Capture of Meanings and Needs (Verbally based)

- Ethnographic interviews
- Questionnaires
- Day-in-the-life analysis
- Activity analysis
- Cognitive task analysis
- The five whys
- Conceptual landscape
- Think aloud analysis
- Metaphor elicitation
- Be your customer
- Customer journey
- Personas
- Scenarios
- Extreme Users

Capture of Meanings and Needs (Non Verbally based)

- Game playing

- Cultural Probes
- Visual journals
- Error analysis
- Fly-on-the-wall observation
- Customer Shadowing
- Body language analysis
- Facial coding analysis
- Physiological measures
- Electroencephalograms

Simulation of Possible Futures

- Word concept association
- Role playing
- Focus groups
- Co-design
- Experience prototype
- Real fictions
- Para-functional prototypes

Human Centred Design as a Business Strategy

In recent years many businesses have shifted their emphasis away from matters of technology and manufacture, moving instead towards a growing preoccupation with how their products, systems or services are perceived and experienced by the consumer. The commercial imperative of this shift is demonstrated by statistical analysis such as the work of Eric Von Hippel (2007) of the MIT Business School who has noted 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". Empirical evidence from product failures supports the claim that human centred design improves commercial success.

Human centred design is also well aligned with the corporate branding frameworks (Olins 1990 ; Aaker 2004) which many businesses use to present themselves to the world and to position themselves with respect to their competitors. For example, the well-known four vector model of corporate identity proposed by Olins (2008) is based on the positioning of the brand within a system of products/services, environments, communications and behaviour. Such a system is heavily human centred, with a strong emphasis on interaction, communication and meaning. Other popular branding frameworks can be even more human centred. For example the "4D Brand Mind Space" proposed by Gadd (2001) positions a given product or service within a space defined by four basic types of human need: functional, social, mental and spiritual.

In recent years numerous marketing and branding studies (Aaker 2002 ; Schultz, Antorini and Csaba 2005 ; Von Hippel 2005 ; Lindstrom 2005 and 2008 ; Gobe, 2009 ; Hill 2010 ; Holt and Cameron 2010 ; Shaw, Dibeehi and Walden 2010 ; Du Plessis 2011) have noted the importance of addressing the cognitive, perceptual and emotional needs of customers. Further, the recent deployment of neuroimaging technologies has permitted (Du Plessis 2011) the direct measurement of how the perceptual, cognitive and emotional characteristics of products, systems and services impact upon human neural pathways and human neural function. Sales and customer service data from the cited marketing and

branding studies as well as direct neurological evidence support the claim that human centred design improves commercial success.

As a business strategy (Verganti 2009) human centred design is not consistent with the well-known paradigm of “technology push”. The value propositions (Osterwalder and Pigneur 2010) which emerge from “technology-push” activity are not necessarily directly related to the expectations, needs or desires of the customers. Instead, they are usually based on characteristics of technical novelty or technical optimisation.

As a business strategy, human centred design is not necessarily consistent with the well-known paradigm of “market pull”. Despite involving significant interaction with customers, “market-pull” activity will normally be performed within the limits and confines of existing semantic and cognitive frameworks. Interacting with customers from within the boundaries of existing products, systems, services and meanings most naturally produces only incremental innovation of some degree.

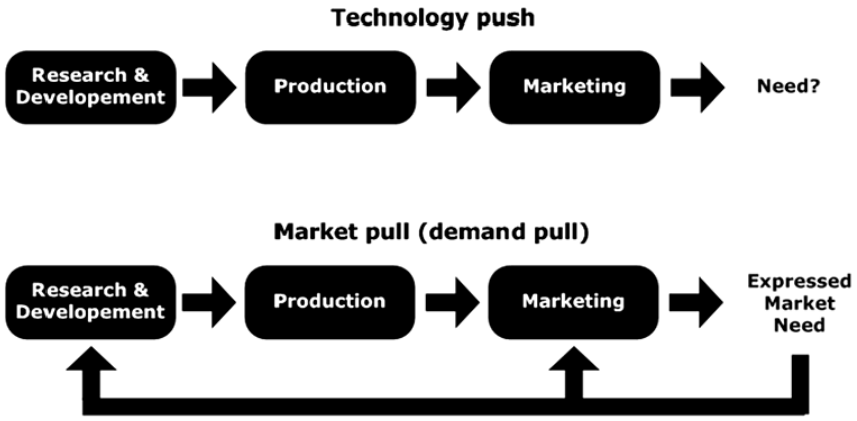

Figure 7) Comparison of the technology-push and market-pull business strategies.

When practiced as a process of questions and answers regarding the relationships which are established between the design artefact and the people, human centred design assumes the form of a “hybrid market-pull” business strategy which involves the business proposing new meanings and possible futures to people, then responding to the commentary and feedback. While sensitive to characteristics of creativity, ideation and identification of possible futures, human centred design depends even more critically on widespread communication, interaction and co-creation (Sanders and Stappers 2008). As a business strategy, human centred design therefore normally involves:

- A change of business strategy (Hatch and Schultz 2008)
- Identification and integration of ethical challenges (Brown 2005)
- Better communication of the vision (Temporal and Alder 1998)
- Greater communication within the business (Gray, Brown and Macanufo 2010)
- Greater interaction with the customers (Von Hippel 2005)
- Greater communication between the customers (Cesvet, Babinski and Alper 2009)

While not without drawbacks (Steen 2012) such as the risk of pre-conceived stereotypes and meanings entering into the human centred design process by stealth, the paradigm

does nevertheless provide a systematic umbrella approach for developing products, systems and services based on matters of perception, interaction, learning and meaning.

Conclusions

Reflections upon the meaning of the word “design” have been made and a relatively complete definition of the paradigm of human centred design has been formulated. Evidence has been provided of the economic benefit of human centred design as a business strategy, and evidence has been provided of the coherence of the design paradigm with the logic and structure of several currently popular marketing and banding frameworks.

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