

## **DIFFERENTIATING CO-DESIGN AND MASS CUSTOMISATION FROM A USER-COMPLETION WITHIN THE REALM OF PRODUCT DESIGN**

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**Abstract:** Increasingly, the roles of designer and end-user are becoming blurred. Since the emergence of participatory design, the involvement of the end-user in the design process has continued to grow. This involvement has been facilitated by new ways of making, manufacturing and distributing products, helped in part by the World Wide Web.

The shift in the role of designer as final decision maker, to that of co-collaborator with end-users, has been steadily growing in the past ten years. This paper seeks to tease out the field of co-design and differentiate it from mass customization. This paper will question why end-users increasingly want to be a part of the design process, and how this can facilitate a greater emotional bond between the product and the end-user. In addition, the authors outline a new approach that can be applied to the product design process titled ‘user-completion’ which operates at the intersection between mass manufacture and craft practices.

**Keywords:** *Co-design; product attachment; personalization*

### **1. Introduction**

The design disciplines are in a state of flux – the output of design, the practice of the designer and interaction with other disciplines and protagonists, including non-designers, is changing. As has been explained in relation to Transformation design, “the design industry is once again on the cusp of a new phase,” as new fields and ways of working are continuing to emerge (Burns, Cottam, Vanstone & Winhall, 2006: 11). In particular, the role of the designer and end-user is becoming increasingly blurred. Since the emergence of participatory design in the last half of the twentieth century, the role of the end-user has become increasingly rethought and integrated into the design process.

This rethinking has responded to the recognition by designers that end-users are in a privileged position to best understand their needs and wants. As Elizabeth Sanders (cited in Szita, 2009: 109) has said, “everyone is an expert on their own experience as a user.” Additionally, in a time when “our relationship with new possessions seems so much emptier”, the creation of products that enable a strong emotional connection with the end-user is pivotal to encourage product retention (Sudjic, 2008: 18). Enabling the opportunity for meaningful involvement by the end-user in the design process increases the likelihood that a product, that will be needed, desired and loved, will be designed.

Firstly, this paper will outline the different approaches to design in which the end-user is part of the design process rather than as a more traditional passive recipient of the final output. An emphasis will

be placed on co-design. Secondly, the paper will question why end-users increasingly want to be a part of the design process, and how through their involvement, and investment of effort, the product adopts added perceived emotional value. Thirdly, a new approach will be proposed which is currently under development by the authors. What the author's are terming a *user-completion* approach will be outlined, as well as its perceived value and point of difference within this broader matrix of collaborative design approaches, in particular that of craft and mass-customisation. The user-completion approach has been devised to be applied specifically to the last stages of product design process and will therefore be explained through the physical process of assembling and finishing a product or object.

## 2. Co-design and the design process

To understand the role of the end-user in co-design, it is necessary to define the design process. The design process is distilled in this paper to comprise the following tasks that may or may not occur sequentially: 1. The identification of a need or want 2. The development of a refined brief 3. Concept development and testing of design ideas 4. The design development phase 5. Prototyping 6. Manufacture 7. Final Product 8. Attachment to or disposal of the product by the end-user.

This is just one way to understand the phases in the design process and acquisition of the product. A variant of this model is provided in the text *Product Design* which lists - research; the brief; concept design; design development; detail design; and production- as the main stages in the design process (Rodgers & Milton, 2011: 15). As explained by Paul Rodgers and Alex Milton (2011: 15), "some stages may occur in a different sequence or may even be omitted altogether, as each product has its own unique set of requirements and the product designer's role may, as a result, vary."

Table 1 illustrates the key points in the design process that involve the end-user in relation to three design approaches of co-design, open source design and user-centered design. These three design approaches have been selected for consideration in this paper because of their ability to be applied to physical design outcomes. Approaches such as transformation design, service design, and interaction design are often (although not always) linked to non-physical outcomes and so have not been included for discussion here

**Table 1.** Illustrating the design process indicating key points of end-user involvement in relation to co-design (□), open source design (★), and user-centered (□) design approaches.

<i>Need / Want Identified</i>	<i>Brief / Research</i>	<i>Concept</i>	<i>Design Development</i>	<i>Prototype</i>	<i>Manufacture</i>	<i>Product</i>	<i>Attachment / Disposal</i>
□	□	□	□	□			
			★			★	
□	□						

Co-design, as understood by the authors, is often utilized in the earlier phases of the design process. Elizabeth Sanders and Pieter Jan Stappers (2008: 6), however have defined co-design as "collective creativity as it is applied across the whole span of a design process", for them it is a "specific instance of co-creation." According to Sanders and Stappers (2008: 6) co-design does not simply refer to the collaboration between trained designers, but importantly also encompasses designers collaborating with non-designers during the design process. According to this definition, co-design is unlikely to take place during or after the manufacture phase, as the co-design approach relies on facilitating collaboration between the involved parties.

The terms co-design and co-creation are "often confused and/or treated synonymously with one another" (Sanders & Stappers, 2008: 6). Co-creation is a broader use of the idea that refers "to any act

of collective creativity” (Sanders & Stappers, 2008: 6). Sanders (cited in Szita, 2009: 109) has said that “Co-creation means researching people’s needs at the start of a project, in order to generate the ideas to make products and buildings that work in an optimal way, while avoiding expensive mistakes.” In this sense the outcome is not known at the outset of the project but emerges as a result of the collaborative act (Sanders & Simons, 2009: 1).

Co-creation is closely linked to the premise of open source design, which allows for free adaption of an idea or product. Open source design involves the “originator of an idea” passing “it on to others who then take it in new directions, all of which dissolves clear authorship or attribution” (Chick & Micklethwaite, 2011: 50). The establishment of Creative Commons has arguably facilitated this growth by providing designers the ability to designate the terms under which their work will be used. The Creative Commons licenses give designers the ability to control the use of their work and “indicate which rights they want to retain and which they are happy to give away in relation to their work” (Chick & Micklethwaite, 2011: 50). Open source design however is arguably not co-creation, as in this approach the relationship between the designer and end-user is severed once the designer offers the idea/product for use. Design files are now being shared and sold for adaption via online platforms such as Ponoko ([www.ponoko.com](http://www.ponoko.com)).

Elevating the role of the end-user has been explored since in the 1970s in a user-centered approach. This approach involves three key undertakings -1. “Looking from the point of view of the end user.” 2. “Making things visible.” 3. “Prototyping.” (Burns, et al, 2006: 18-19). This approach therefore retains an emphasis on the earlier design development phases. It involves generating data for the designer to respond to and is therefore not truly collaborative with the end-user. Sanders and Stappers (2008: 10) have explained that user-centered design does not:

*address the scale or the complexity of the challenges we face today. We are no longer simply designing products for users. We are designing for the future experiences of people, communities and cultures who now are connected and informed in ways that were unimaginable even 10 years ago.*

A more active involvement of the end-user in the design process is clearly not only beneficial for the designer but has the potential to generate better design outcomes for the end-user.

### **3. Why do end-users want to be part of the design process?**

From the point of view of the designer, end-user participation in the design process can result in creating products that are more desirable, will be retained longer and are more suited to their use. Ruth Mugge, Jan Schoormans and Hendrik Schifferstein (2009: 467-468) have explained that when an end-user connects emotionally with a product, this product shifts from being simply a functional object - “In other words, the product ceases to be an ordinary object and becomes extraordinary.” If an end-user is not only involved in the design process, but also owns part of the process, such as the manufacture, or assembly and personalization, the emotional bond formed is even greater. Mugge et al (2009: 469) explains that the “personalization process requires the investment of a great deal of effort, the person is occupied with the product for an extended period of time, which may positively influence the strength of the emotional bond with the product”.

From an end-users perspective there might be quite different reasons that drives the desire for involvement. Involvement with the development of a final design or design personalization, allows the end-user to tailor the product to their individual needs or personal aesthetic inclinations. It also helps the end-user identify the product as their own (Mugge et al, 2009: 468). End-users may want to be involved with the process purely for fun, or because everyone is creative and wants to shape and form their environments and the products that populate them (Mugge et al, 2009, 468). Donald Norman (2004: 224) has said, “We are all designers” in recognition of the many design acts we perform everyday in our lives. Sanders and Stappers (2008: 9) have similarly stated that, “all people are creative...” This is elaborated on further by Sanders and Simons (2009: 1) who have stated:

*People are increasingly seeking outlets for their creativity. This activity can be observed most readily online in the form of user-generated content that appears on YouTube, Facebook and Etsy. It is also seen in the growth of the crafts and hobbies industries, and the growth of the “big box” do-it-yourself*

*chains such as Home Depot. One of the key values of value co-creation is that it satisfies the need for creative activity while addressing the need for social interaction.*

Another notable form of user-generated content is the blog. The blog provides a creative outlet for many Internet users allowing bloggers to share thoughts, select and curate images and provide commentary. This burgeoning of user-generated content demonstrates the need for designers to tap into this trend and adapt their design processes to allow end-users to make use of their creativity in a meaningful way and personalize their products.

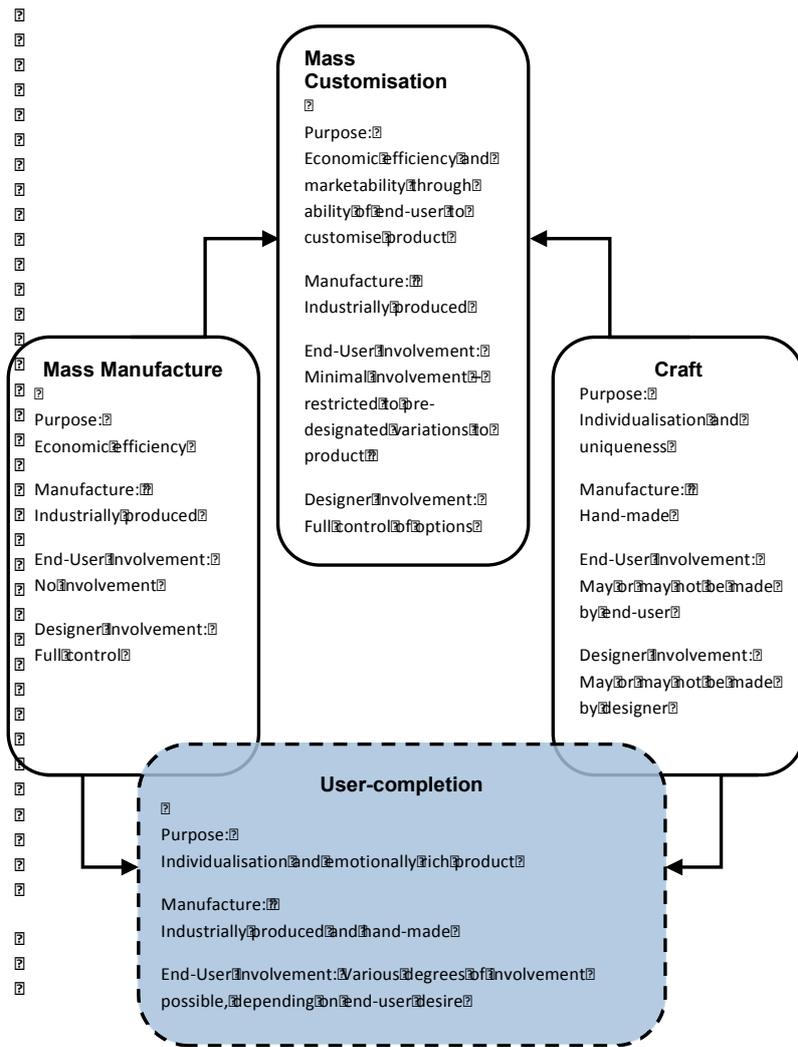
#### **4. A user-completion approach**

The *user-completion* approach proposed by the authors is focused on a specific point in the design process- assembly and completion. It is important to note that while the authors believe that the user-completion approach has the potential to be applied to various fields of design, it is considered here specifically in relation to product design and will be explained through the final stages of product assembly and finishing. The user-completion approach allows the end-user to devise how the final product will look, how it goes together and its visual appeal. In the user-completion approach, the 'product' would be presented as a 'design kit' or series of specifically designed components, that can be fitted together in various combinations, that the end user will assemble to their individual needs and tastes. Until the end-user undertakes these tasks, there is no final product and possibly no function associated with a product. This approach relies on the specialized skills of the designer to provide the components and understand the manufacturing options, while leaving the details of the finished product to the end-user to decide upon. If we took the example of a small side table as the product, the product kit may come with various combinations of legs and or table tops which the end user could chose upon purchasing either online or in store. The table may then also allow for different finishes and or decoration to be applied, these finishes or decorations would be allowed for by the designer and 'designed in' to the components. Instructions could be provided, again either online or in an illustrated form.

The authors suggest that co-design does not allow in its definition the ability to accommodate this method of working because co-design relies on collaboration between the designer and end-user. In a user-completion approach the designer retains full control until a certain point and then hands over the mass manufactured 'kit-of-parts' to the end-user to adapt, make and complete. Importantly, an element or technique must be designed into the product that allows the end-user to personalize the product during its making.

Handing over the final details of a design to the end-user recognizes the shift that has occurred in design away from the "paradigm of the master-designer" (Burns et al, 2006: 6)." Mies van der Rohe famously said that, 'God is in the details.' It is in the details that arguably the most important design decisions take place, and to enable end-users to customize these details gives the opportunity to create products that are not only more suited to their final use but are also personalized.

The user-completion model responds to parts of the design process that seem to generally fall from the end-user purview in a co-design model. A user-completion model is particularly concerned with the final phases in the design process – the making, the formation of the final product and end-user attachment to the product.



**Figure 1.** Diagram illustrating the differences and similarities between user-completion, mass manufacture, mass customization and craft.

A user-completion approach requires an amount of time, effort and skill from the end-user to complete the design. These areas of the process are also very much entrenched with the materials and finishing, hence through the choices made, they result in an individual personalization of the product. Ruth Mugge et al. (2009: 472) believes, that “the more effort a person invests in a product during the personalization process, the more self-expressive value this product obtains, and the stronger the emotional bond with this product becomes”. She goes on to say that, “for the formation of a strong emotional bond with the product, the consumer should personalize the object through an effortful process” (2009: ).

Figure 1 illustrates user-completion in relation to other methods of making – mass manufacture, mass customization and craft - and highlights that this approach has both similarities and differences to these various other methods of making. Table 2 compares end-user involvement in different stages of the design process in relation to a co-design approach

**Table 2.** Illustrating the design process indicating end-user involvement in relation to co-design (□), and user-completion (◻) design approaches.

<i>Need / Want Identified</i>	<i>Brief / Research</i>	<i>Concept</i>	<i>Design Development</i>	<i>Prototype</i>	<i>Manufacture</i>	<i>Product</i>	<i>Attachment / Disposal</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The user-completion model has parallels with craft practice. Craft is characterized by the involvement of the hand with the object and hand-made making processes. It is reliant on the “maker’s tacit knowledge and skill, based on repeated practice, and involves chance and an ability to improvise” (Sparke, 2009: 20). Therefore in contrast to mass manufacture, craft results in one-off, unique objects. In recent years craft has seen a resurgence in popularity, demonstrated for instance by gorilla-knitters. There are also vast numbers of craft related websites. See for instance dedicated sites such as <http://craftzine.com/> Hella Jongerius (cited in Schouwenberg, Rawsthorn, & Antonelli, 2010: 31) has explained that, “handicraft offers a powerful response to the restrictions of industry, but it has to be intelligently incorporated into the industrial process.” A user-completion approach seeks to combine craft and mass manufacture by enabling the end-user to personalize mass manufactured elements in a craft-like manner.

Mass customization, “where the end user gets to choose certain features such as colour and apply them to a pre-designed product”, may on the surface seem to be similar to a user-completion approach, yet the degree of involvement by the end-user differs (Szita, 2009: 109). Customization within a mass customization production is based on a set of predetermined selections and therefore limits the level of personalization available. Frank Piller (2008: 631) describes mass customization production as providing, “an offering that meets the demands of each individual customer, but that can still be produced with mass production efficiency.” Therefore in a mass customization approach to production, end-users have control over some preselected aspects of the finished designed product. Frank Piller (2008: 631) has suggested that manufacturers should provide toolkits to enable end-users the potential for “defining, configuring, or modifying their individual solution within the given set of choice options.” Although this suggests links with a user-completion model, with mass customization the final finished product is provided to the end-user. Ruth Mugge believes, that in order for an emotional bond with the product to emerge, effort is what is required during the personalization process. Mugge et al. (2009: 473) feels that often in relation to mass customization this effort, both mental and physical, is low (and physical is generally absent altogether). A user-completion model therefore holds less in common with mass customization than it does with craft practice however it does rely on processes of personalization that can be seen illustrated to some extent, in a mass customization approach.

In a user-completion approach, it is the actual physical interaction with the product that completes the production of the product. In this case it is understood then that the effective design of the ‘design kit’ is crucial, it must give the end-user enough options, so that they can create many diverse product functions and/or appearances. It also should not require high-level skills that the end-user may not possess, and therefore will become frustrated, or will not be able to complete the product. Preferably it should allow people with differing level of skills to both low skilled and highly skilled to be challenged and obtain a satisfying result. The ‘design kit’ crucially incorporates an element or activity over which the end-user retains control, allowing the finished product to be truly personalized. It is this aspect that sets user-completion apart from mass customization, along with the final physical making of the product by the end-user.

## 5. Conclusion and discussion

As can be seen, there are a number of differences between the user-completion model outlined by the authors, and co-design and mass customization. The most important being where they occur in the

design phase. User-completion encompasses the handing over of the non-complete product to the end-user for completion and personalization. It encompasses the act of physically altering the product, to give new or changed forms or visual appearance. The personalization of the product through the user-completion model has unlimited outcomes that requires crafting by the end-user, unlike mass customization where there are limited choices that the end-user can select.

The user-completion model encompasses a 'design kit' or components designed by the designer that the end-user physically manipulates, again requiring a degree of effort and craft. It is this level of physical involvement in completing and consequently personalizing the product that has the potential to enable a deep emotional attachment and satisfaction with the product.

Yet, while the user-completion model offers a number of exciting opportunities for end-user involvement and developing deeper sentimental attachment to the product, it also presents its risks. The designer must keep in mind that "people may spoil the product, because they are not sufficiently skilled to design their own product" (Mugge et al., 2009: 473). This in turn could become a negative for a company brand that adopts this user-completion approach as the final outcome may "conflict with a company's branding strategy and with its intended image (Franke & Schreier, 2002: 231)."

Deyan Sudjic (2008: 31) has said that, "The old definitions of design, and the skills that realizing them demanded, are being marginalized by the rapidly changing nature of objects. The most noticeable change is the way that so many artefacts are converging." Today in design not only are artefacts converging but also the roles of designer and end-user are growing ever closer. Everyone is creative and many end-users want to use their skills and develop personalized products. The literature suggests that end-users are more likely to form an emotional attachment to a personalized product. A user-completion approach has ties with mass manufacture and craft but differentiates itself through the role that the end-user plays. The user-completion model described here is still in its infancy and requires further development. This approach to product design is a proposal by the authors, with the next step being to put it in action and assess its successes and failings. However, it is hoped that it will provide, even at this early stage, designers and end-users alike with a new avenue of exploration and a mechanism for generating exciting new creative output in product design.

## References

- Burns, C., Cottam, H., Vanstone, C., & Winhall, J. (Feb 2006). RED Paper 02: Transformation Design. *Design Council* Retrieved 14 Nov, 2011, from <http://www.designcouncil.info/mt/RED/transformationdesign/>
- Chick, A. & Micklethwaite, P. (2011). *Design for Sustainable Change: how design and designers can drive the sustainability agenda*. Lausanne: AVA Publishing.
- Franke, N., & Schreier, M. (2002). Entrepreneurial opportunities with toolkits for user innovation and design. *International Journal on Media Management*, 4(4), 225-234.
- Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. J. (2009). Emotional bonding with personalised products. *Journal of Engineering Design*, 20(5), 467-476, doi: 10.1080/09544820802698550
- Norman, D. (2004). *Why We Love (or Hate) Everyday Things*. New York: Basic Books.
- Piller, F. T. (2008). Observations on the present and future of mass customization. *International Journal of Flexible Manufacturing Systems*, 19(4), 630-636. doi: 10.1007/s10696-008-9042-z
- Rodgers, P & Milton, A. (2011). *Product Design*. London: Laurence King Publishing.
- Sanders, E. B. N. & Jan Stappers, P. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5-18, doi: 10.1080/15710880701875068
- Sanders, L. & Simons, G. (Dec, 2009). A social vision for value co-creation in design. Open Source Business Resource Retrieved 14 Nov, 2011, from [http://www.maketools.com/articles-papers/Social\\_Vision\\_for\\_Value\\_CoCreation\\_in\\_Design.pdf](http://www.maketools.com/articles-papers/Social_Vision_for_Value_CoCreation_in_Design.pdf)
- Schouwenberg, L., Rawsthorn, A., & Antonelli, P. (2010) *Hella Jongerius: misfit*. London: Phaidon.Sparke, P. (2009). *The Genius of Design*. London: Quadrille.
- Sudjic, D. (2008). *The Language of Things*. London: Allen Lane.Szita, J. (2009, Sep/Oct). Everyone's an expert. *Frame*, 108-111.