



# Design Process: The Importance of Its Implementation

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**Abstract.** Product design is a complex area that requires planning to successfully meet customer requirements. This complexity is proportional to the challenge in innovation and development, therefore the design acquires a new meaning. The lack of experience in design of both the companies and the designer should be guided in a direction in which the design is linked to concepts such as innovation and knowledge, in order to improve the benefits it provides. In this way, the design process becomes the structure of the development of a project with specific tasks from its initial stage, to the final stages of implementation.

**Keywords:** Design process · Product design · Product innovation · Iterativity · Convergence · Divergence

## 1 Introduction

The complexity rooted on Product design has been one of the factors in charge of setting the level within a company, even more so when concepts like innovation are continually emerging and evolving, so the utilization of tools and knowledge acquired has gotten essential.

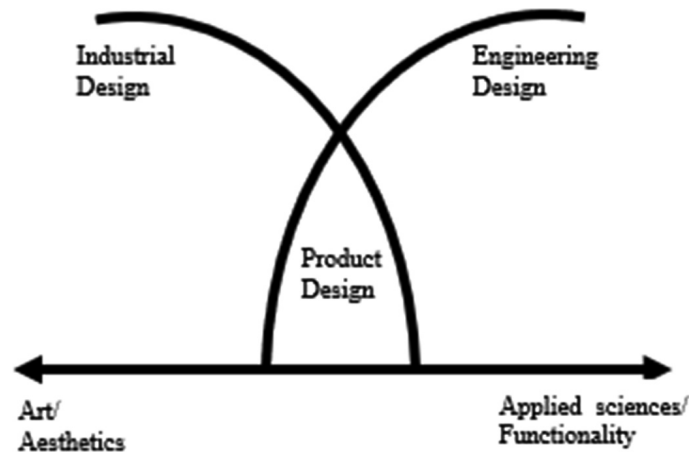
One of the tools that has become more practical, for the capability of adaptation that it presents by allowing the selection of one among many others, is the design process, which will benefit the Product designer or the company, by means of having established phases to follow up during the project, encouraging to participate in an inquiry to identify the most relevant data for the project.

There are some qualities that have been identified as relevant to consider during the development of a design process, the iterativity plus the convergence and divergence that it presents. These concepts allow to take the project further by means of not closing it immediately after the last phase has been completed but to consider the data given by the results, for example, during the evaluation phase and return to previous stages to make it better.

## 2 Product Design

Product design is well known to be a discipline that is able to provide competitive advantages to companies from several factors like customer retention and company performance. When creating a new product, companies should create and sell these to appeal, like and motivate customers to buy them, so one of the principal purposes of a product designer will be to complement the quality of the user's life in any aspect [1].

The above, is accomplished through the multidisciplinary of product design, where an analysis is able to show us the intervention of other areas to reach common goals, to have a successful product, functional, profitable that is able to make a remarkable differentiation from the competition, but that it is also able to hook the customer with its appearance and cost. In order to comply with these goals, the participation of several disciplines is optimal when developing a new product or improving and existing one, so this is where product design generates a convergence from discipline to discipline as seen on Fig. 1, that is adapted from Kim and Lee [2].



**Fig. 1.** Industrial Design (left) and Engineering Design (right) show their convergence towards meeting Product Design (center) in order to show the application of art/aesthetics (left) and applied sciences/functionality (right).

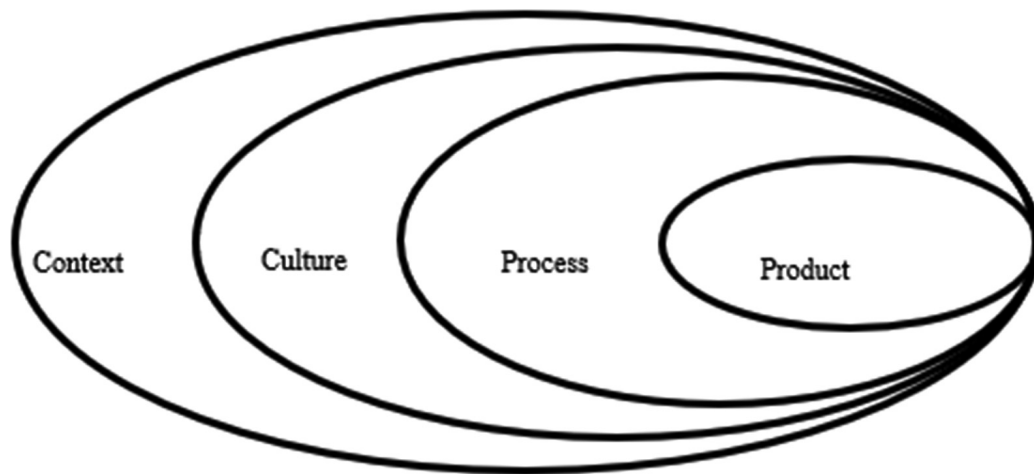
The incorporation of Industrial Design and Engineering Design as disciplines through Product Design is implied on Fig. 1, where it is possible to assure the integration of tools or processes that are capable to enrich the development of a product from art and aesthetics to applied sciences and functionality, where a previous immersion onto the product needs or specifications will lead to what is needed the most to make it a good product and avoid poorly designed products that will most likely fail cost wise, timewise and even with its principal purpose of being designed, whichever it may be [3].

So either visualizing a convergence more towards applying Industrial Design or Engineering Design to develop and design a product, the designer will be known as an object creator and we can see design itself as the axis from which factors like innovation can part [4].

Nowadays, innovation has become into an important factor for design, where the increase of its use is able to upgrade the competitive level, which we can see as creating a bond with knowledge [5].

Said bond is linked directly to the visualization where design stands along with the product, the process and the culture with the environment, without taking into consideration these concepts a certain approach would not be possible.

Figure 2 provides an explanation of the agents that are initially involved on a product development as established by the Argentine Industrial Union (UIA) [6].



**Fig. 2.** Agents involving the development of a product, from *context* (left) to the *process* (right) that will take place to create de product, perform together in order to comply with the customer needs, as well as those of the company.

The context is determined as an agent of change for the design of a product, where through its analysis, the identification of new opportunities or ideas that are capable to perform and adapt to current trends is possible, either from economic, social and environmental factors to medium and long term referrals [6]. Also, the culture and the process are greatly involved on the design of a product, with which it is possible to first, target the market and then to establish the best process for its creation where having as an antecedent the context and the culture it will be easier to set a production plan according to the resources that are available. The involvement of these three agents, when implemented accordingly, will set the competitive level of an organization with factors like user approval and the fulfillment of costs and time.

### 3 Product Innovation

“Innovation can be defined as a continuous process within the companies that is addressed towards incremental improvements in product design” [7], it involves changes and improvements to technologies, products, processes and services that result in positive contributions for customers and other constituents of business organizations. An innovation is a creative new solution to the prevailing conditions and trends and fulfills the expressed and latent needs and wants of customers and stakeholders [8]. This means that innovation is the source from where companies are able to maintain its competitive level through new product development (NPD).

The creation of new products or solutions for existing ones is said to generate a value if they fit into a future of wellness for the users and the environment through innovation, where this wellness can be seen as a link between people, the planet and the profits.

The following three statements can help to get us closer to what designers need to consider while designing an innovative product [4]:

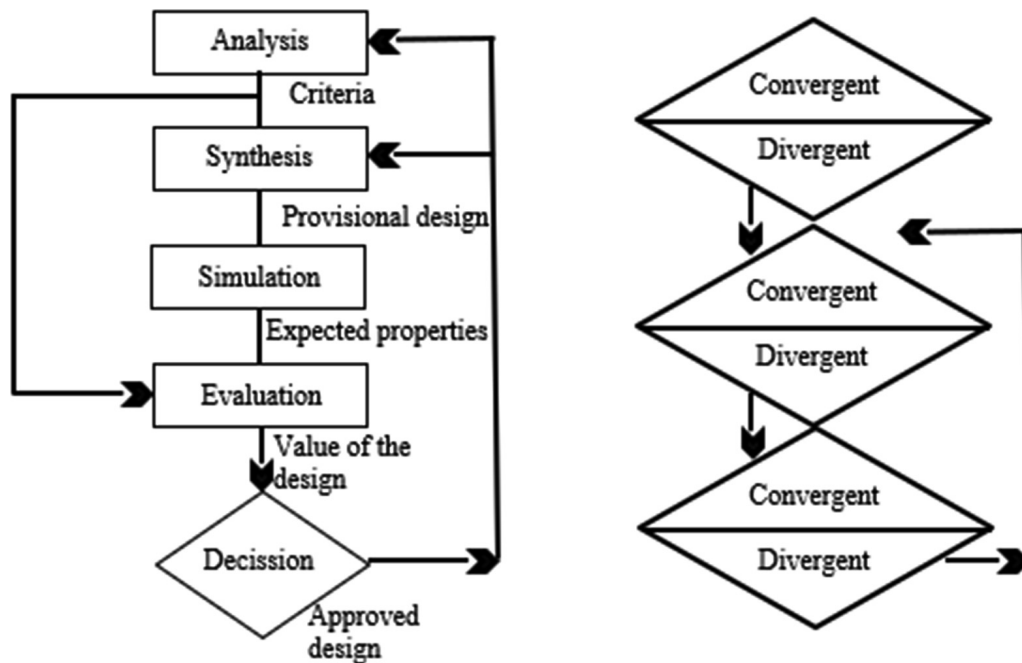
- Social and equity needs should be taken into consideration to create opportunities (people).
- Consider the load capacity of the ecosystem when implementing the production and consumption system (planet).
- Global value change is taken into consideration, in order to create an equity value for users and interested parts of the project (profit).

Taking into consideration these statements is a maximization for NPD where product innovation should take place as a strategy that is part of a process with which it is possible to get a product release into a safe place, where it is less likely that it will fail since product innovation makes it possible to consider concepts like why, what, who and how, same concepts that take the designer to more established tasks within the NPD like planning, developing, implementing and evaluating through a set of tools or steps in order to assure the best result for a NPD [8].

### 4 Design Process

The incorporation of a design process into a NPD has become part of the structure of a successful outcome since it suggests an analysis, a synthesis and an evaluation through its different phases where all of these become a whole in order to provide an optimal result. With this we could simplify the design process as the structure of a NPD.

Nowadays, there are multiple design processes that designers can use, still the main order can be identified from a called basic cycle of design, proposed by Roozenburg and Eekels in 1998 (see Fig. 3).



**Fig. 3.** The basic cycle of design by Eekels and Roozenburg characterized by its iterative quality and complemented by setting the convergence and divergence on its different phases.

As seen on Fig. 3 [9], the basic cycle of design integrates the phases that initiate to incorporate the whole of a NPD, from which it is able to part to more specific phases that will adjust according to the focus of the process, thus it will adapt to the needs of each project and organization. Also, the integration of the iterativity on this process opens a guideline for a well-established design process, where it allows to return to previous phases given the results on the current one.

One clear example could be the design process used by The James Dyson Foundation for their Dyson Supersonic™ hair dryer, since it is based by an iterative nature, which allowed the organization to prototype, test and improve as many times as they believe was necessary, this gave them a unique product [10].

Besides the creation of a unique product that will fulfill the needs of the user, we may identify some statements that are additional benefits of using a design process:

- It allows to maintain control, which allows to make a decision of what to communicate and to who.
- It is possible to administrate new resources towards a planned strategy.
- To order the development of the product and make sure to identify errors and opportunities that may be difficult to catch before the product has been manufactured.
- Economize resources and explode at a maximum the capacity of designers for exploration, attempting to work from something general to something particular.
- Start from an identified problem in order to get to original solutions or optimize an existing one.
- To visualize the process as a whole with anticipation, optimize resources and improve the strategies according to the detected needs [6].

Finally, the optimization of said benefits will be set also by the convergence and divergence that is indicated on Fig. 3, providing a more approachable way to apply the process by giving a more graphic explanation of where there should be an opening or closing of the project data, so the graphical representation of the design process will also represent an essential part for its correct application since it provides a better understanding of it at first glance.

## 5 Conclusion

The importance of implementing a design process though Product design relies on the contribution within innovation and knowledge to the companies, which eventually sets the differentiating factor with others by means of quality, use of resources and perception of the product by the end user, also it will establish the capacity and knowledge of the Designer to comply with the completion of complex projects that deliver a well-structured product.

## References

1. Rodgers, P., Milton, A.: Product Design. Promopress, Barcelona (2011)
2. Kim, K.M., Lee, K.P.: Two types of design approaches regarding industrial design and engineering design in product design. In: 11th International Conference of Design, pp. 1795–1806. Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb The Design Society, Glasgow, Dubrovnik (2010)
3. Maldonado, A., Balderrama, C., Pedrozo, J., García, J.: Diseño Axiomático: Fundamentos y aplicaciones. Libermex, Mexico City (2019)
4. Ferruzca, M., Fulco, D., Aceves, J., Gazano, G., Revueltas, J.: Aproximaciones conceptuales para entender el diseño en el siglo XXI Compilación. Universidad Autónoma Metropolitana, Mexico City (2016)
5. Pavón, J., León, G., Hidalgo, A.: La gestión de la innovación y la tecnología en las organizaciones. Pirámide, Madrid (2014)
6. Unión Industrial Argentina: Diseño de Productos: Una oportunidad para innovar. Instituto Nacional de Tecnología Industrial, San Martín (2012)
7. Fundación Pro dintec: Diseño industrial guía metodológica Predica. Gráficas Rigel, Asturias (2006)
8. Rainey, D.: Product Innovation: Leading Change through Integrated Product Development. Cambridge University Press, Cambridge (2009)
9. Reinders, A., Carel, J., Brezet, H.: The Power of Design: Product Innovation in Sustainable Energy Technologies. Wiley, Sussex (2013)
10. The James Dyson Foundation. [https://www.jamesdysonfoundation.com/content/dam/pdf/Standalone\\_DesignProcess.pdf](https://www.jamesdysonfoundation.com/content/dam/pdf/Standalone_DesignProcess.pdf)