Design Thinking VS Lean Thinking

Sara Gancho Gonçalves

Coordinator for the Design Management Master course and Auxiliar Professor at IADE – Universidade Europeia IADE/UNIDCOM
sara.gancho@universidadeeuropeia.pt

Ana Filipa Carvalho Gonçalves

Master in Design Management - IADE Creative University.
afgoncalves93@gmail.com

Rita Alçada Ramos da Cunha

Master in Design Management - IADE Creative University.
rita1996goncalves@gmail.com

ABSTRACT

This project is based on the analysis of two distinct philosophies present in organizations, Lean Thinking and Design Thinking. The present study seeks to discuss the similarities and differences of these two diverse philosophies, the method in which they operate in the companies and are still compared according to various assumptions. Finally, a brief analysis of how these two ideologies could complement each other in a business environment will be presented, which is the primary objective of this article.

The project appears during a brainstorming, between the two authors of this essay. Belonging to such distinct academic worlds, from the beginning it was noticeable that a possible meeting between the knowledge of each area, design and engineering, could result in an interesting and innovative dissertation, a dual perspective that is fully unified.

As a conclusion, it was noticeable that both methods observe their advantages, however, their interconnection proves to be an asset for an organization that focuses on innovation.

KEYWORDS

Empathy. Innovation. Value. Waste. Unification.

RESUMO

Este projeto baseia-se na análise de duas filosofias distintas presentes em organizações, o Lean Thinking e o Design Thinking. O presente estudo procura discutir as semelhanças e diferenças destas duas filosofias diversas, o método como atuam nas empresas em que se inserem, sendo ainda comparadas consoante vários pressupostos. Finalmente, será apresentada uma breve análise de como estas duas ideologias se poderiam complementar num ambiente empresarial, sendo esse o objetivo primordial do presente artigo.

O projeto surge aquando de um brainstorming, entre as duas autoras do mesmo. Pertencendo a mundos académicos tão distintos, foi desde o início percetível que uma possível união entre os conhecimentos de cada área, Design e Engenharia, poderia resultar numa dissertação interessante e inovadora, uma perspetiva dual que se unifica em pleno.

Como conclusão foi percetível que ambos os métodos observam as suas vantagens, porém, a interligação dos mesmos prova ser uma mais valia para uma organização que apresente como foco a inovação.

PALAVRAS-CHAVE

Empatia. Inovação. Valor. Desperdício. Unificação.
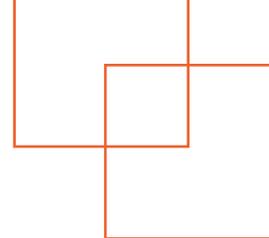
1 INTRODUCTION

Trends in the field of business administration are always changing. The most profitable methods of today may lose traction tomorrow. That fact leads companies into a constant state of alertness in their search for innovation and technology capable of giving them an advantage in the markets in which they are inserted. However, in our view, and according to the opinions of several authors we reviewed, there are two main philosophies of entrepreneurship which will, if adequately adjusted, prove to be timeless and a guarantee of success when implemented in an organization. These philosophies are Design Thinking and Lean Thinking. Each represents a different face of management thinking. In theory, Lean Thinking focuses on eliminating waste in technology businesses, while Design Thinking is aimed at more dynamic campaigns which utilize this philosophy in order to create hypothetical success models. However, there is a universe of presuppositions behind each philosophy making them global and feasible for a management environment. Based on this synergy and osmosis, this paper focuses on the heretofore unrevealed amplitude of each method and the ways in which they may be a factor for success if conjoined.

2 DESIGN THINKING

In a world where the pressure for increasingly immediate and effective results is an established reality, Design Thinking has become a valuable asset to companies by eliminating several risks through statistical supposition and by becoming the safest path to innovation.

Design Thinking is a methodology used by designers to solve complex problems and find desirable solutions for customers by creating empathy with stakeholders and involving the customers in project development (Tim Brown, 2008). In the same line of thinking, Borja de Mozota (2003) writes about the participation of the persons involved in a process as fundamental to its perceived value and to an increase in different solutions and approaches to the problem. According to this author, this is a consequence of each individual's unique life experience, with one fundamental factor being the collaboration of all involved or interested parts, be they internal or external in relation to companies.

According to Ambrose and Harris (2010), a design mindset doesn't focus on problems but on solutions and always seeks to innovate.
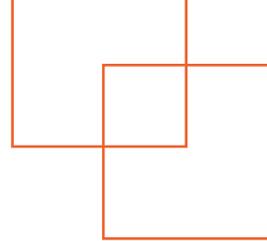
This philosophy is based on logic, imagination, intuition and systemic thinking and aims at exploring possibilities and creating desired results to benefit the target client through a combination of multiple experiences (Desconsi, 2012).

We can still observe that one of the principles of Design Thinking is to focus on the human beings through (1) empathy, (2) collaboration and (3) experimentation (Pinheiro & Alt, 2011). This principle may be applied to different business divisions, from sales to marketing and strategy. The main objective of this approach is to visualize and think about the product through the eyes of the consumer, in order to maximize engagement (Brown, 2010).

Design Thinking methodology relies on visual tools to create options and search for alternative solutions, in order to generate a universe of collaborative ideas with clients in a multifunctional fashion. It presents a prototype stage that allows clients to experience in practical terms what is being created (Ambrose & Harris, 2010).

The creation of personas, storyboards and storytelling, as well as the use of metaphors and photographies, are all part of the sequential method that maps clients' attitudes and behaviors, catches their attention and helps them understand the company's vision (Stuber, 2012).

2.1 THE PROCESS

Figure 1: EMPATHIZE -- DEFINE -- IDEATE -- PROTOTYPE -- TEST

Source: authors.

Laboratório de Orientação da Gênese Organizacional - UFSC
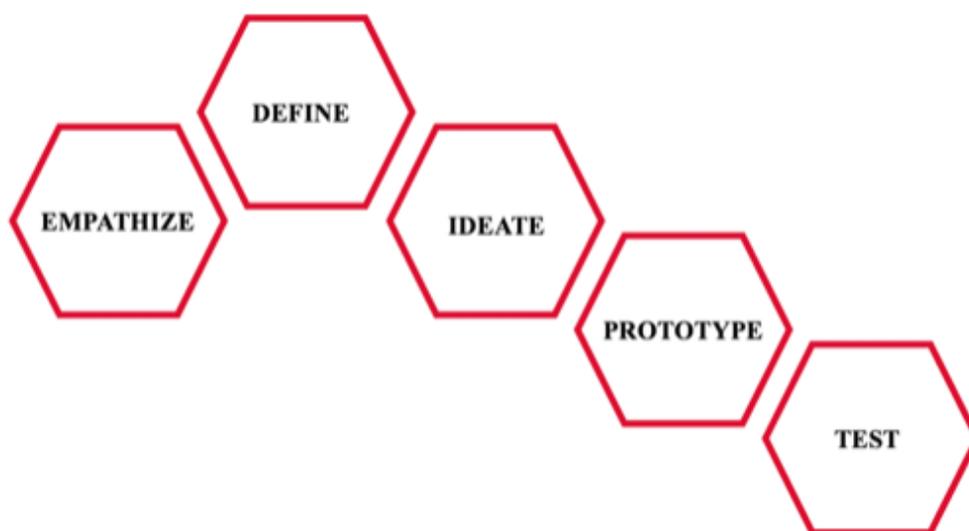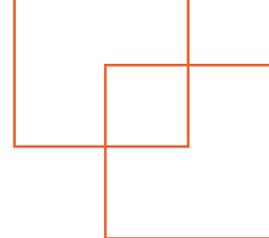
"We spend a lot time designing the bridge, but not enough time thinking about the people who are crossing it." (1) - Dr. Prabhjot Singh Director of Systems Design at the Earth Institute (Página 5)

Process (based on the analysis by Ambrose and Harris).

1- Empathize. Empathy is crucial to a human-centered process like Design Thinking. Its objective is to obtain an empathetic comprehension of target groups and the problem being solved. It involves a profound understanding of the experiences and motivations of clients through observation. A useful tool at this stage of the process is the SWOT analysis.

2- Define. At this stage, it is imperative to analyze the collected information and synthesize them in order to define the main problems. At the end of this stage, designers will be able to bring together ideas of excellency with their respective resources, functions and other elements that will allow them to find solutions to the problem.

3- Ideate. As the name suggests, this is the stage where ideas are generated. "Outside the box" thinking is extremely important at this stage, with the application of techniques such as brainstorming and brainwriting, which stimulate its subjects to think freely and expand solution hypotheses. The more ideas and solutions are found at this stage, the greater its success.

4- Prototype. This is the experimental stage. Through the creation of prototypes which materialize the ideas discussed during the former stage, it is possible to identify the best solution to each identified problem. Prototypes allow for the investigation, examination, betterment or acceptance of predefined ideas. At this stage, an initial interaction with clients is possible in order to determine how they behave towards, or feel about, the final product.

5- Test. The last stage is reserved for rigorous testing of the complete product incorporating the best solutions identified at the prototype stage.

3 LEAN THINKING

Lean Thinking was born in the automobile industry when mass production proved to be expensive in the face of transformations in the products. This industry offered low cost products to consumers, however without much variety and/or quality, as observed by Mary Poppendieck (2002).

The Lean Thinking process, at the production level, refers to the advantages of both mass and artisanal modes of production, bringing them together in order to avoid the rigidity of mass production and the high
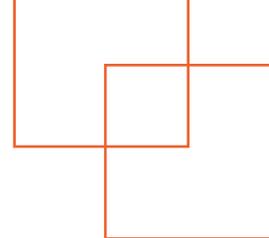
costs of artisanal production (Womack et al., 1990). This methodology adopts five fundamental principles cited by Womack and Jones (1997): the definition of value for the client, i.e., an understanding of value from the client's perspective; mapping the value stream, i.e., the identification of activities which add value and eliminate waste along the process; creating flow, i.e., achieving the highest possible efficiency in all value-adding activities to increase process flow; establishing pull, i.e., production levels determined by client demands; and, finally, pursuit of perfection, referring to an intrinsic culture of improvement and development. Lean Thinking can also be seen as something more than a tool kit, since it is a transversal approach throughout organizational divisions. Therefore, Lean Thinking can be considered valuable at strategic and operational levels given its practical and strategic orientation (Bicheno, 2004). Lean Thinking relies on multi-qualified teams at varied organizational levels, aiming at lower costs and zero inventory and holding as a primary goal the client's satisfaction through applied quality (Bayraktar et al., 2007). Contemporarily, Lean Thinking is considered a leadership philosophy that became an innovative process in relation to management practices. Such a philosophy turns its focal point towards a gradual elimination of waste and the guarantee of optimal results by utilizing highly uncomplicated processes (Bicheno & Holweg, 2016).

Any activity that does not add value to the business environment in which it is inserted is considered wasteful. Wasteful activities include improper uses of resources that may contribute to an increase of costs and allotted time, and, therefore, also an increase in client dissatisfaction. It is important to observe that waste is the opposite of value, and that all activities that do not add value to the product, according to Lean Thinking, are wasteful since clients will not desire to pay for them. Waste is everything surpassing the minimum necessary amount of resources such as equipment, components, space and workers (Bicheno & Holweg, 2016).

3.1 WASTE

Waste encompasses all activities performed in a process or service that absorb resources without creating value. What follows is an analysis of the seven main types of waste according to Taiichi Ohno (1988), who first defined them:

1- Excessive inventory
Excessive inventory derives from excessive production, yielding unne-

cessary quantities of product with the expectation that it should be requested by clients in the future. Thus, anticipated production generates problems by restricting production in observable situations such as: long preparation times for machinery, long distances across which to haul materials, lack of coordination between work stations and the production of large lots as the inevitable consequence. The Lean system of production thus encourages production of that which is strictly necessary.
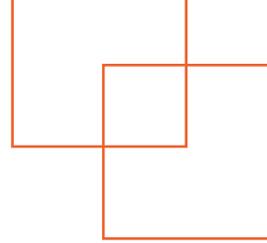
2- Waiting

Waiting waste is manifested in the materials waiting to enter production due to the formation of lines, which in turn guarantee elevated rates of equipment usage. In contrast to those rates of equipment usage, which should follow the rule of necessity, Lean Thinking as a production system promotes material flow in tandem with information flow. Human activity is emphasized over automation, once machinery is more capable of waiting inactively than human workers.

3- Inadequate Processing

This refers to waste caused by a lack of optimization of a production stage. Inadequate Processing relates to activities that do not add value to the product. As a consequence, some fundamental issues are brought under discussion, especially the reason why a certain component is produced, the ways in which this component affects the final product and the component's relevance to its correspondent production stage.

4- Inventory

A type of waste that originates in excessive transportation, supplies that occupy storage space without a correspondent demand, quality defects, and also retention of product due to obsoletion. Adopted methods to prevent this type of waste include the careful planning of quantities of materials, the "Just in Time" concept and the exclusive stocking of strictly necessary materials.

5- Transport

Even though they don't alter the concrete value of the final product, material transportation and personnel movements are fundamental factors in waste, considering the distances materials are necessarily moved across throughout the production process. Such distances are imposed by restrictions in the process and facilities. The Lean production system considers these activities as wasteful of time and resources. The solution to this wastefulness lies in the reduction of inventory to values close to zero and in the minimization of transport distances for both materials and personnel.

6 - Defects

Quality problems are the main factor in the occurrence of this type of
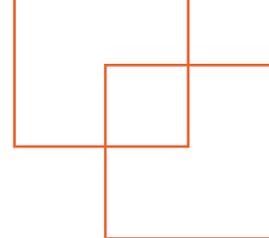
waste, since defective products waste several elements that are crucial to an efficacious production. Inspection operations tend to be eliminated by improvements effected by the Lean production system, which prevent defects. The Lean system focuses on the reduction of the possibilities for defects, thus contributing to the optimization of processes with a stable character.

7- Overproduction

The unnecessary use of materials and occupation of warehouses, the inappropriate employment of means of transportation, as well as excessive inventory are waste factors that originate in overproduction. This type of waste can be avoided by restricting production to the strictly necessary. In this way, the concept of waste is made immediately available and can be easily identified.

3.2 PRINCIPALS (ACCORDING J. WOMAC E DANIEL T. JONES, 1996)

Knowing stakeholders - it is important to know in detail all stakeholders, i.e., all interested parties relating to, affecting or affected by, the entrepreneurial environment and its activities. An organization focusing exclusively on clients while neglecting its investors and workers will predictably fail to achieve good results. Recently, this principle has grown to encompass the external environment and the indiscriminate exploitation of natural resources.

Defining value - the definition of value is critical for the insertion of Lean Thinking in a corporation. Value is understood as everything clients are willing to pay for, i.e., a company has no decision power over the notion or direction of value. Value, as considered by Lean Thinking, arises exclusively from clients, according to their own desires and needs. As such, companies must have the ambition of becoming as the North Star, a reference among others of the same kind.

One of the main factors to be considered is the target cost. Unlike other organizations based on the amount clients are willing to pay, companies using Lean Thinking as a methodology must determine target cost after an analysis of the production stages and their respective waste prevention, taking into consideration a final price defined by the market. In this way, the lower the cost, the higher the profit margin for the company.

Value stream - value stream refers to the various actions needed to put a product through the critical stages in any business. This is a fundamental task to monitor all types of waste and to activate preventive measures.
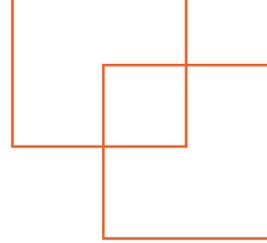
Thus, it is necessary to map all activities and categorize them as either generating or not generating value.

Optimizing flux - flux optimization refers to the ideal sequence of stages to generate value, with a necessity to eliminate all forms of waste found on previous stages. In order to consolidate flux, it is necessary to view the production process globally to synchronize the media involved in the creation of value at all stages.

Implementing pull - pull logic consists in the production of that which is necessary strictly when necessary. It is a process "pulled" by clients, contrary to the usual (and often rejected by clients) process where the producers "push" product. Pull aims at the elimination of inventory, producing and supplying on demand. This does not exclude sales forecasting, it merely allows the client to lead. As a consequence, products gain value and productivity increases as a reduction is obtained on lead times and response times regarding consumer needs.

Search for perfection - Lean Thinking focuses on the elimination of all processes that do not add value, on the occurrence of a continuous flow of actions that adds value and is pulled by the client, and on the analysis of results. This analysis detects further wastefulness and obstacles and creates a range of possible improvements. Within Lean philosophy it is possible to rely on continuous improvement methodologies such as Kaizen or the DMAIC cycle.

Constant innovation - The last step is the development and application of management tools that focus on innovation. Thus, it is necessary consider the size of companies, the sector on which they operate, their organizational culture and structure, their agent systems, their vision for the future and ambitions.

4 DESIGN THINKING VC. LEAN THINKING

In the world of business incubation, Design Thinking—a user-centered method for conceiving and creating a successful product—is often compared and contrasted with the Lean startup approach, which is engineering-based and quantitative. The two methods are far from being mutually exclusive. However, both aim at satisfying client needs with efficacy through a systematic and low-risk path of innovation in the face of uncertainty. The following analysis is based on research by Roland Muller and Katja Thoring (2012). Their research is supported by a profound bibliographic review of publications and study cases, as well as the processes of each
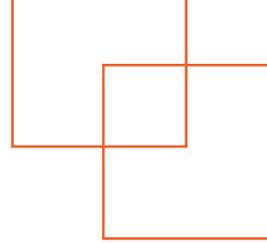
of the aforementioned doctrines. It is important to observe that none of these processes is completely linear since they deal with experiences, cultures and practices that cannot be portrayed in a linear fashion.

4.1 SIMILARITIES

According to the authors, the most recognizable crossover is related to the fact that both Design Thinking and Lean Thinking have the end user as their focus. This is the most relevant similarity between the two doctrines. It is necessary to understand that both doctrines are centered on learning and discovery, reproducing interactions between users and products and achieving goals quickly without great investments of time and money.

Another important feature that Design Thinking and Lean Thinking have in common is a focus on innovation, i.e., both concepts have the same objective—to promote innovation.

The development of a test prototype is also a common approach, with both concepts are applied to gather end user opinions at the earlier stages of production processes in order to avoid wasting resources in the creation of a product that may not achieve success.

Finally, it can be observed as an additional characteristic present in both strategies a rapid iteration due to the problem and the solution not being initially clear. Both teams work under extreme uncertainty, and the developed prototypes suffer great iteration throughout the process (Mueller, et al., 2012).

4.2 DIFFERENCES

Regarding the differences, the authors claim that one advantage of the Lean process is that it is indisputably faster, making it possible to reach conclusions more quickly than with the Design Thinking process. As a consequence, Design Thinking as a process for innovation, even though it may be slower initially, can be valuable for defining the problem to be solved, the qualitative data and the vision regarding a real problem.

In Lean Thinking the initial concept of a business exists from the start. Afterwards, it can be tested to verify its validity and can, therefore, be considerably altered during the development of the project.
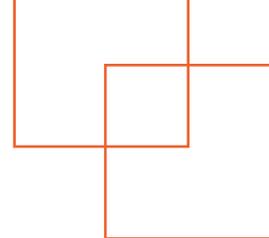
According to Design Thinking doctrine, however, a project starts with a challenge and not with an idea, wherein the solution may be related to solving a "wicked problem." That is to say, the solution may be very ambiguous. The problem is not defined until until an extensive phase of user research has been conducted, with ideas being generated along the process.

About the process of synthesis, Design Thinking suggests several sophisticated methods—or frameworks—to synthesize user research information (Mueller, et al., 2012). Among these frameworks are personas, dual-axis mapping, user journey, and causal mapping. These frameworks help to organize the researched information in a qualitative manner in order to condense them into a Point of View (POV)—which is a kind of micro-theory about the needs of users—which determines an additional direction for the process. Lean Thinking does not work with synthesis methods or qualitative structures.

At the ideation stage, Design Thinking makes extensive use of classic techniques, borrowed from other creative disciplines, in order to generate ideas (brainstorming and brainwriting). Since Lean startup usually begins with a business idea, no ideation technique is explicitly applied.

In relation to quantitative analysis, Muller and Thoring (2012) affirm that Lean Thinking uses evaluation techniques which are based on metrics. There are many suggestions towards the testing of hypotheses and there are checklists for the adjustment of products to their markets. Design Thinking does not suggest evaluation techniques based on metrics.

In its approach to business models, Lean doctrine uses a methodology that helps systematically align interested parties (partners, clients), valuation proposals, necessary resources, cost and revenue structures, channels, etc., for an initial business model. That is not found in Design Thinking.

Qualitative evaluation is frequently used in Design Thinking. Tests and user comments are mainly gathered through qualitative interviews and ethnographic methods. Despite the fact that open interviews are also present in Lean Thinking, the latter does not focus on qualitative data. Furthermore, the methods to conduct and evaluate qualitative analysis are not as developed as in Design Thinking.

4.3 COMPARATIVE TABLE

Table 1: Comparative Table.

	Design Thinking	Lean Thinking
Objective	Innovation.	Innovation.
Focus	Users.	Clients.
Testing/Evaluation	To fail early in order to obtain early success.	To fail early with the goal of perceiving what is failing in order to eliminate waste or make alterations before a new test.
Iteration	Performed.	Performed.
Generation of ideas	A part of the process; solutions are created during the process.	Not a part of the process, since the product vision is provided by company founders from the start.
Qualitative methods	The focus of this process, encompassing detailed user research, field research observations, and even ethnographic methodologies.	Not the focus.
Quantitative methods	Not the focus.	The focus of this process, ranging from the realization of analytical matrices, metrics and tests.
Business model	Not the focus.	The focus of this process.
Main techniques	Qualitative interviews, prototyping, brainstorming, divergence/convergence, field research, among others.	Quantitative interviews, prototyping, simple tests, A/B tests, waste analysis, among others.
Target groups	Users—usually the end users.	Clients—users, buyers, among others.

Source: authors.

5 CONCLUSION

The development of this paper gave rise to an interesting set of considerations regarding the two processes being researched, pointing to the fact that companies may benefit from a more diversified vision without adopting "classic" paradigms. We have found the main object approached by Lean Thinking—which focuses on the search for waste, making it possible to present value propositions by utilizing numeric data in the processes of decision-making and creation—to be essentially product management supported by those analytic pillars. Lean Thinking repre-

sents an approach that depends greatly on process quickness, insofar as it aims at adjusting to what is needed by the market within a minimal time frame. It is a process that focuses on utilizing only the minimum amount of resources needed to make a product, with minimum waste.
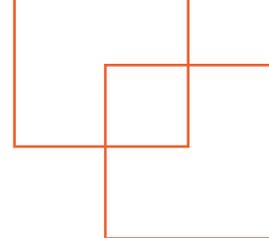
Additionally, we observed that Design Thinking as an approach tends to put the user on a prestigious position, since it prescribes the performance of field research that expands knowledge of the users' needs and, as a consequence, strengthens proximity with them. However, this process demands a larger allotment of time. Quick design iterations are employed as a means to define the problem to be solved, bringing processes together in visual and communicative forms and performed in teams. However, under this light it is possible to conclude that some form of synergy takes place when the two methodologies are used in tandem, which may result in greater perception of individual tools, greater benefit being gained from the generated information, and a wider range of opportunities and possible solutions.

Thus, it is possible to conclude that, in contemporary society, both methods present advantages that vary with the type of product and target client. A combination of Design Thinking and Lean Thinking proved to be an asset to organizations adopting constant innovation as their goal.

6 REFERENCES

Ambrose, Gavin e Harris, Paul. 2010. Design Thinking. s.l. : AVA Publishing SA, 2010.

B.Modi, Denish e Thakkar, Hemant. 2014. Lean Thinking: Reduction of Waste, Lead Time, Cost through Lean Manufacturing Tools and Technique. International Journal of Emerging Technology and Advanced Engineering. 2014, Vol. 4.

Bayraktar, Erkan, et al. 2007. Evolution of operations management: Past, present and future. Management Research News. 11, 2007, Vol. 30.

Bicheno, John e Holweg, Matthias. 2016. The Lean Toolbox - A handbook for lean transformation. 5. Buckingham : Production and Inventory Control, Systems and Industrial Engineering (PICSIE), 2016.

Citeve. 2012. Ferramenta de Desenvolvimentoe aplicação do Lean Thinking no STV. 2012.

Desconsi, Juliana. 2012. Design Thinking como um conjunto de procedimentos para a geração da inovação: um estudo de caso do projecto G3. Porto Alegre : s.n., 2012.
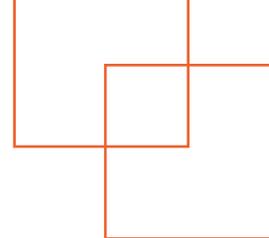
Design Thinking. **Brown, Tim**. 2008. Junho de 2008, Harvard Business Review, pp. 1-10.

Design Thinking for Social Innovation. **Brown, Tim e Wyatt, Jocelyn. 2010.** 2010, Stanford Social Innovation Review, pp. 31-35.

Ford, Henry. Goodreads. [Online] https://www.goodreads.com/quotes/904186-if-you-always-do-what-you-ve-always-done-you-ll-always.

Mozota, Brigitte Borja de. 2003. Design Management - Using Design to Build Brand Value and Corporate Innovation. Canada : Allworth Press, 2003.

Mueller, Roland M. e Thoring, Katja. 2012. Design Thinking vs Lean Startup: a comparison of two user-driven innovation strategies. Leading Innovation Through Design. 2012.

Pinheiro, Tenysson e Alt, Luis. 2011. Design Thinking Brasil. s.l. : Campus, 2011.

Principles of Lean Thinking. **Poppendieck, Mary.** USA : s.n.

Stuber, Edgard Charles. 2012. Inovação pelo design: uma proposta para o processo de inovação através de workshops utilizando o design thinking e o design estratégico. Porto Alegre : s.n., 2012.

UNHCR. 2015. 10 quotes that will spark your design thinking. [Online] 12 de Junho de 2015. http://www.unhcr.org/innovation/10-tweetable-quotes-that-will-spark-your-design-thinking/.

Womack, James P. e Jones, Daniel T. 1997. Lean Thinking: Banish Waste and Create Wealth in Your Corporation. Journal of the Operational Research Society. 1997.

Womack, James P., Jones, Daniel T. e Roos, Daniel. 1990. The Machine That Changed the World. s.l. : Free Press, 1990.
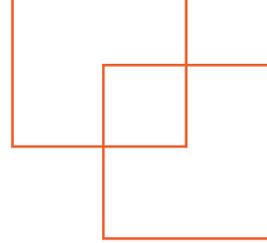
Sara Gancho Gonçalves

Sara Gancho is the Coordinator for the Design Management Master course and Auxiliar Professor at IADE, Universidade Europeia, where she lectures in the areas of Marketing, Business Design, Project Management, Design Management, Design Thinking and Design. She is a Senior Researcher in the Envision the Future Cluster - Speculative Design Research, at UNIDCOM/IADE Unidade de Investigação em Design e Comunicação. She has worked in the areas of Design, Marketing and related since 2005.

Ana Filipa Carvalho Gonçalves

Ana holds a Master's degree in Design Management from IADE Creative University. She has a degree in engineering and industrial management and has been working at Ferver Lab Lisboa since 2018 with the aim of making the startup's reputation grow nationally and internationally.

Rita Alçada Ramos da Cunha

Rita has a Master degree in Design Management at IADE Creative University. She graduated from the Católica do Rio de Janeiro, Brasil and IADE (Institute of Art, Design and Enterprise - University, Lisbon, Laureate International Universities). Currently works as an assistant to Gonçalo Mello at Beauty Coach MasterClass.