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Design thinking applied to the health sector: A case study in a Brazilian hospital

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Abstract: Being innovative is an important feature for companies that wish to be competitive and survive in the marketplace. However, there are different paths that could lead to innovation and different approaches that emerge with the intention to help companies innovate. Design Thinking is one of these approaches. It proposes an innovation process centered on the user that can be applied to a wide array of contexts. This study aims to describe the application of Design Thinking in the health sector, report the experience gained, and analyze the results. Initially, the literature on the subject was reviewed, including the main models of Design Thinking in Brazil and other countries. The approach was applied to the hemodialysis unit of a hospital in Belo Horizonte, Brazil. The main goal was to innovate and improve the experience of patients in their first week of hemodialysis sessions. Finally, the results were analyzed, a contrast between what was planned and what was actually done was studied, and a comparison between the literature and the practice was established. The study issue is fairly recent and there were not many cases for comparison. In this particular project, it was not possible to prove that the approach improved the experience of hospital patients.

Keywords: design thinking, healthcare, design methodology.

1. Introduction

This work approaches the application of the Design Thinking (DT) methodology on the health sector. According to Brown (2008), this methodology consists of an approach to innovation focused on the human being, using tools and methods from design integrating the user's needs to what is possible in the scope of technologies and to what is viable in the scope of strategies in the business, creating value to the users and competitiveness to the company. The research was conducted in a hospital that showed to be a viable environment to apply and analyze the methodology and the concepts of DT, given that the ones responsible for the institution showed to be interested and with a considerable opening to the project's team.

The hospital was founded in 1944 and it is destined mostly to the Unified Public Health System (SUS). It is guided by human dignity, reaffirming the hospital's condition as a philanthropic institution. The hospital has many projects that support the humanization and search for the integration between the workers, the institution's partners, the patients and their families, with the goal to become the most pleasant environment helping in health's recovery.

It was proposed the application of the DT methodology, in a hospital sector, aiming to develop a solution through design's tools and methods. The solution proposed was focused on human dimension, taking in consideration the needs of the ones involved. The use of this approach in the health sector creates the possibility of hearing the patient's needs and using their expertise as a source of improvement and innovation. The main goal of this paper is, therefore, the critical analysis of the DT methodology through its application in the health sector, besides evaluating the results of its implementation to the health sector throughout a study of cases in the hospital. To do so it was realized a comparison between what is proposed in the DT related literature and its application in the hospital, discussing the main difficulties in applying the DT in this specific case.

2. The concept of Design Thinking

Although considerably new, the term *Design Thinking* has received increase attention lately, especially in the management context (HASSI; LAAKSO, 2011). Analyzing the literature the presence of two speeches on the topic is noticed: the first one in the scope of Design and the second one in the scope of management (JOHANSSON; WOODILLA, 2009). In this work, we analyze the concept of Design Thinking related to management.

The concept of DT has its origins in the work of the North American design company IDEO. Brown (2008) defines DT as an approach to innovation focused on human being that uses design's tools. The main goal of this

approach is to integrate: the needs of the users (*desirability*), to what is viable in the field of technologies (*feasibility*), and to what is viable to the business strategy (*viability*); creating value to the users and competitiveness to the company (Figure 1).

The DT has been seen as a way of creating solutions that go beyond the ones that were developed by conventional analytical methods, based on creativity and systemic thinking (KORIA et al., 2011). The term is also defined as the way that designers think (MARTIN, 2009; DUNNE and MARTIN, 2006) structured in a way that people without a degree in design can use its creative tools with the purpose of solving complex problems (IDEO, 2013).

According to Martin (2009), DT is the productive mix of the analytical and the intuitive thoughts. Martin (2009) believes that we need both kinds of thought to analyze the past, plan what you can do from it, and create possibilities that go beyond what has already been crated. Using only the analytical thought would lead to outcomes that will be nothing more than the improvement of the past results, excluding, most of the times, big improvements. On the other hand, if applying only the intuitive thought to the problem, available data might not be fully employed, creating, frequently, a process of trial and error. According to Martin (2009), using DT means applying both ways of thoughts, analytical and intuitive, to business problems. Moreover, Johansson and Woodilla (2009) describe DT as a continuous cycle of creation of ideas, tests and generalizations, that has as a main goal targeting complex problems of an organization. According to the authors, the concept of DT has become, recently, a portal so that the design area can contribute to the context of business innovation.

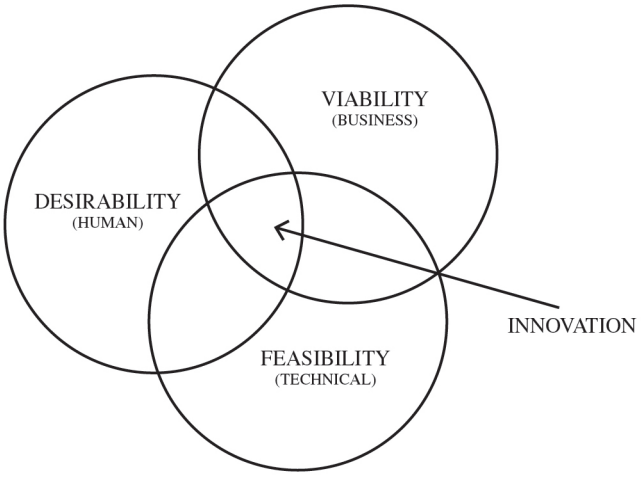


Figure 1. Design Thinking. Source: Brown (2009).

2.1. The main elements of Design Thinking

To explore the main elements of DT, this work used the structure created by Hassi and Laakso (2011), that classifies the major elements of DT in three groups: Practices, Cognitive Approaches and Mindset. This classification is a result of the literature, besides the interviews with specialists in this topic, and has as a goal to define the essential elements of the theme in one structure (Chart 1).

2.2. The Design Thinking applied to the health sector

According to Jones (2013), the health sector is a highly complex system that deals with at least two sources of complexity: the institutional (hospital) and the personal (biological and social configuration of the human body). The existing relations between these two scopes create a variety of possible problems and conflicts, also creating intervention opportunities through design. In this context, the DT has conditions to contribute positively, as an example, to the improvement of the comprehension of the hospital's material, to the support with the spatial orientation, besides improving the user's education and the hospital's information resources.

In many countries the services provided in the health sector have become more and more focused on the patient (COULTER, 2011), paving the way for the design acting in this field. The role of Design in this scenario is, therefore, according to Charnley, Lemon and Evans (2010), to create innovative solutions in services, integrating social, economical and environmental phenomena. The author proposes an approach to innovation focused on the patient, based on DT, with the premise that the experience lived by the patients and workers of the health sector are a different kind of expertise from the technical knowledge on the area, and still it is not very explored. This expertise comes from experiences like living many years with a specific health condition or being subjected to a specific medical procedure. This approach has as main goal to challenge the way innovation happens in the health sector. Taking in consideration the needs and the perspective of the patient in the beginning of this project, opportunities were built so that these perspectives can lead the process of creating ideas, influencing the decision making in a process of co creation. The health sector can beneficiate from it, once it helps in the identification of new opportunities to improve the service already existing (ELBERSE et al., 2012). McNichol (2012) states that the innovation that has its origin in the demands of the patients and it is validated and influenced by them has more chances of being successfully implanted in the health sector, suggesting the use of DT as a facilitator in the process of innovation, making the participation of many workers possible, and also suggesting the combination of this approach with others already existing to facilitate the divergent thought.

Chart 1. Elements of *Design Thinking*.

PRACTICES	COGNITIVE APPROACHES	MINDSET
- HUMAN CENTERED APPROACH e.g. People-based, use-centered, empathizing, ethnography, observation (e.g. Brown (2008); Holloway (2009); Ward, Runcie and Morris (2009)). - THINKING BY DOING. E.g. Early and fast prototyping, fast learning, rapid iterative development cycles (e.g. Boland and Collopy (2004); Lockwood (2010); Rylander (2009)). - VISUALIZING E.g. Visual Approach, visualizing intangibles, visual thinking (e.g. Carr et al. (2010); Drews (2009); Ward, Runcie and Morris (2009)). - COMBINATION OF DIVERGENT AND CONVERGENT APPROACHES. E.g. Ideation, pattern finding, creating multiples alternatives (e.g. Boland and Collopy (2004); Drews (2009); Sato et al. (2010)). - COLLABORATIVE WORK STYLE. E.g. Multidisciplinary collaboration, involving many stakeholders, interdisciplinary teams (e.g. Dunne and Martin (2006); Gloppen (2009); Sato et al. (2010)).	- ABDUCTIVE REASONING E.g. The logic of "what could be", finding new opportunities, urge to create something new, challenge the norm (e.g. Fraser (2009); Lockwood (2009); Martin (2009)). - REFLECTIVE REFRAMING E.g. Rephrasing the problem, going beyond what is obvious to see what lies behind the problem, challenge to given problem (e.g. Boland and Collopy (2004); Drews (2009); Zacca in Lockwood (2010)). - HOLISTIC VIEW E.g. Systems thinking, 360 degree view on the issue (e.g. Dunne and Martin (2006); Fraser (2009); Sato (2009)). - INTEGRATIVE THINKING E.g. Harmonious balance, creative resolution of tension, finding balance between validity and reliability (e.g. Brown (2008); Fraser (2009); MARTIN, 2009).	- EXPERIMENTAL & EXPLORATIVE E.g. The license to explore possibilities, risking failure, falling fast (e.g. Brown (2008); Fraser (2007); Holloway (2009)). - AMBIGUITY TOLERANT E.g. Allowing for ambiguity, tolerance for ambiguity, comfortable with ambiguity, liquid and open process (e.g. Brown (2008); Fraser (2007); Gloppen (2009)). - OPTIMISTIC E.g. Viewing constraints as positive, optimistic attitude, enjoying problem solving (e.g. Brown (2008); Fraser (2007); Gloppen (2009)). - FUTURE-ORIENTED E.g. Orientation towards the future, vision vs. status quo, intuition as a driving force (e.g. Drews (2009); Junginger (2007); Martin (2009)).

Source: Hassi and Laakso (2011, p. 59).

3. Methodology

The methodology adopted in this research was proposed by Vianna et al. (2012) and it is divided in immersion, ideation and prototyping. These steps are not linear but overlapped throughout the project.

3.1. Immersion

The immersion is the first step of the project. In this step the team must try to understand the problem from the point of view of the company that hired the service and the user of the product or service. This step is divided in two: Preliminary Immersion and In-depth Immersion.

In the Preliminary Immersion the goal is the superficial understanding of the problem, the definition of the project's scope and its boarders. With this information the next people to be approached and the areas that relate with the context studied can be pinpointed. These actions are even more important when the project's team is not familiarized with the context. To get these results three activities developed are: *Issue Framing, Exploratory Research and Desk Research.*

During In-depth Immersion, what was noted in the preliminary immersion is detailed. This step has a strong exploratory character once it stimulates the participation of the team in the studied context, in a more sensitive way. The goal is to create empathy and comprehend how the user feels and behaves, and why they do so. There are many techniques to develop this step, like: interviews, direct observation and participation, photographic register, awareness cards (journals made by the own user) etc.

3.2. Ideation

During ideation the goal is to create original, creative and innovative ideas. In this step the involvement of different expertise is necessary, forming a multidisciplinary team. The proposed method also has the user as a co-creator in sessions of participative creation. The many different profiles guarantee a more extensive solution. The ideation phase has some techniques pointed out in the methodology: *brainstorming*, menu of ideas and positioning matrix.

3.3. Prototyping

Prototyping is a tool to validate the ideas and it can happen throughout the project (Figure 2). The concretization of the ideas through the prototypes guarantees the interaction of the user, the evaluation, the identification of possible errors and the construction of viable solutions. This process

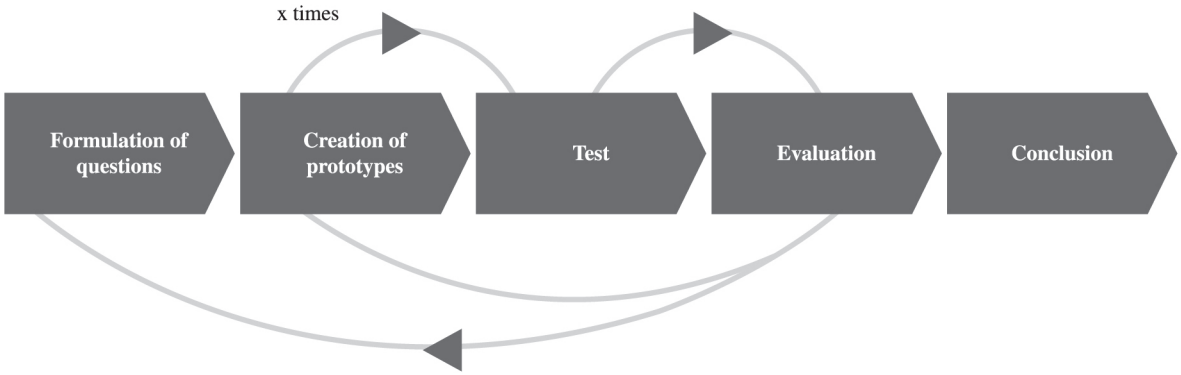


Figure 2. Prototyping Process. Source: Vianna et al. (2012).

is a learning instrument about the team's perspective on the project, because it increases the fidelity of the solution, and about the user's perspective, that can improve the solution through the evaluation. A prototype might have different levels of fidelity and contextualization.

The fidelity defines how close the prototype is to represent the solution in reality. The context defines the level of the prototype's test, according to the immersion in the final context to which the solution was developed. The authors don't present a detailed description of how the method is applied in the companies; however, they show case studies that help in the comprehension process of a DT project.

4. Case study: Implementing a Design Thinking program in the Hospital

The hospital complex consists of three units in which about 600 thousand procedures are made a year. Most of these are made by the Unified Public Health System (SUS). With around 1000 workers and 260 doctors in its staff, the hospital holds 25 thousand chemotherapy procedures, 32 thousand hemodialysis sessions and over 27 thousand pediatric appointments.

Two last year Industrial Engineering students and one consultant from an innovation consultancy company, responsible for supervising the students, composed the project's team. This formation showed to be determinant in the results achieved as well as in the gaps noticed. It must be noted that this project was realized on a voluntary basis, being a learning opportunity on DT (to the students) and an important experience applying and disclosing the method (to the consultancy company). The schedule created by the team (Chart 2) predicted a timeframe of five months to the development of the project.

4.1. Implementation process

On this section the main activities performed during the execution of the tentative schedule of the project will be described, as well as the real duration and effective deliveries of each.

4.1.1 The preliminary immersion in the Hospital

The preliminary immersion began with a meeting of the project's team and the directors of four sectors of the Hospital: nursing, psychology, communication and an association of institution's friends. The choice of who was going to be on the meeting was made by the Hospital's Superintendence. During this meeting the concept of Design Thinking was presented in addition to the characteristics and goals of the project. The team prepared the scrip of a semi-structured interview, guiding the conversation with the Hospital's representative. During the meeting, information of general character about the hospital were requested (number of beds, number of wings, working hours, number of patients, the existence of seasonality, etc.) and some specific information about the sectors of the representatives were also needed (challenges faced, daily activities, relationship with the patients, etc.).

In the conversation during the meeting, the Hospital's representatives suggested the prioritization of three wings, during the preliminary immersion. Taking in consideration the size and the complexity of the Hospital, the mapping, even superficial, of every wing would take more than the available time to the project. Therefore, the prioritized wings were the Hemodialysis, the Volunteering and the Wing of the Terminal Patients.

During one week, the team visited each of the three wings once, with the intention of: interviewing and observing the behavior of the workers and patients, besides mapping the main challenges of each. After visiting the prioritized wings the team had more meetings. In these meetings, the information gathered during the preliminary immersion was registered and categorized, according to the wing it belonged, and after grouped according to similarities.

As a result, maps containing the challenges faced by each wing visited were built, as well as the relation between them. Aside from the maps, cards were created with the major challenges of each area. The process of the maps and the cards' creation occurred in an intuitive way, the team

Chart 2. Schedule.

PHASE	PREDICTED TIMEFRAME	GOALS	DESIGN THINKING TOOLS	TEAM'S DELLIVERY
Preliminary Immersion	35 days (Nov/13 - Dec/13)	Understanding of the Hospital's context Mapping of the setting Acquisition of general information Familiarization of the team in the Hospital's environment	Exploratory research Desk Research	Mapping of the wings visited Interview with the main stakeholders.
Results' Presentation and Prioritization	7 days (Dec/13)	Result's presentation of the Preliminary Immersion Phase Definition of the challenge to be explored and of the project's boarders (together with the Hospital Board)	-	-
In-depth Immersion and Analysis & Synthesis	21 days (Jan/14)	Immersion in the context of the challenge chose in the previous phase. Deepen the observations obtained on the first immersion. Create empathy and understand how the user feels, behaves and why they do so. Identify patterns of behavior.	Personas Customer Journey Map 'Sombra' 'Um dia na vida'	-
Ideation	10 days (Jan/14 - Feb/14)	Creating ideas, by the team or in sessions of participative creation.	Brainstorming Positioning Matrix	Menu of Ideas
Prototyping	14 days (Feb/14)	Validate ideas from the previous phase. Come up with tangible ideas through prototypes to provide interaction with the user, evaluating and identifying possible mistakes.	-	Prototypes
Completion	14 days (Feb/14 - Mar/14)	Production of the final Report Discussion of the possibility to incorporate permanently the solutions developed on the Hospital.	-	Final Report

didn't take as basis any methodology or literature to build it. To each map one main challenge was defined, which was connected to other ones.

After the preliminary immersion, a meeting with the Hospital's representatives was held to show the activities that had been performed. In this meeting the maps, the cards and the user's testimonies were presented. At the end it was asked to the Hospital's present staff to point out which of the challenges presented they would want prioritized on the next step of the project (In-depth Immersion). Three challenges received a significant attention of the representatives. First, the improvement of the image of the Terminal Patient's Wing. Second, make the reception and the access to information better to the hemodialysis' patients, and third, get the hospital's staff more involved with the volunteers.

After the meeting with the Hospital's representatives, a meeting of the project's team was held. On this meeting it was expected to discuss which of the challenges it was going to be prioritized on the next phase. However, the discussion didn't happen, the consultant announced to the rest of the project's team that the challenge related to the Hemodialysis sector would be the one prioritized on the next phase, the In-depth Immersion, not taking in consideration the opinions of the Hospital's representatives. Some of the arguments to justify this choice were: the complexity of the challenges proposed the time and resources available, and the consultant and the consultancy company's interest. Such decision was abided by the members of the team, announced to Hospital's representatives and accepted by the same.

4.1.2 In-depth immersion and analysis & synthesis

In the beginning of the In-depth Immersion, a meeting between the team members of the project was arranged to create a strategy of how to collect information to the next stage. In this meeting, the main profile of hemodialysis users was mapped and the main stakeholders that should be interviewed were defined. It was also defined how to use the DT tools that create empathy with the users. These tools are: 'Shadow', 'A Day in the Life' and 'Similar Situations'.

Thus, during the In-depth Immersion, some semi-structured interviews were applied with patients that hadn't been interviewed in the Preliminary Immersion. One of the members of the project used the 'A Day in the Life' tool, pretended to be a patient of the hemodialysis unit in the Hospital and registered the observations to report back to the team. Another member, using the 'Shadow' tool, followed a patient with kidney dysfunction in his house. The aim was to understand how the patient relates with the limitations (specially the limitations concerning the diet). In the desk research, the team researched about some health conditions that also require a restrictive diet. Each one of the team members adopted some diet restrictions (gluten,

lactose and sugar) to create empathy, to understand how the user feels and behave. In addition to that it was possible to identify extreme behavior.

4.1.3 Ideation

During de ideation stage, the first step was to use the *personas* built in the previous step and create 'Users Journeys' to each one of them. The journeys were created by the team members and were supposed to translate the stages of the relationship between the patient and the hospital, from the first day, the adaption period, to the end of the first week of hemodialysis. To encourage the ideas generation, these journeys were based on two scenarios: unlimited resources available and extreme limitation of resources. According to the ideas that emerged in this initial step, the team prepared an intervention proposal to the hemodialysis unit in the hospital.

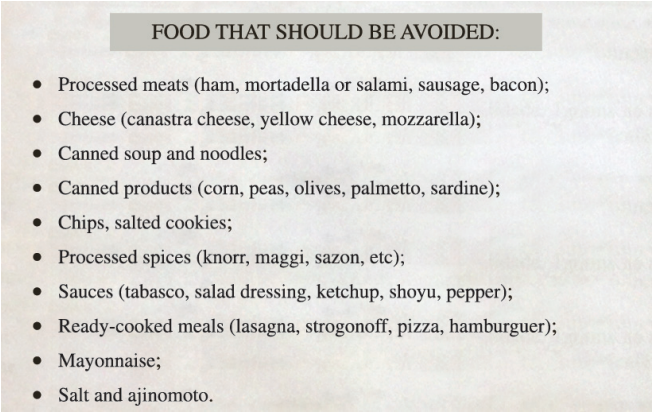
This proposal was drawn with two main focuses. Those were the support to the patient in his adaption period (welcome during the first week) and the patient education regarding the diet. To the first one the team planned the welcome of hemodialysis patients. This welcome is built by three moments. The first moment is the initial contact between patient and the hospital team when he is presented to his mentor (angel) and receives orientation guides. In the second moment, the patient follows to his first session of the treatment (exams and weighing) with the mentor. Meanwhile, the companions can attend lectures or read books. The final moment of the welcome cycle is a game of questions and answers about the diet. Regarding the diet, the team designed a prototype of a nutritional guide with the assistance of a graphic designer. The guide has important information and illustrations about the diet to be followed by patients with dysfunctional kidneys (Figures 3 and 4).

4.1.4 Prototyping

During the prototyping, the Nutritional Guide created in the last stage was validated in the hospital. Some patients of the morning shift had contact with the material and suggested some modifications in it. These modifications were important to create a second version of the guide. The main observations made by the patients were important to make the guide more visual and appropriate to the public (Figure 4).

5. Results and discussion

At the end of the project, the main result obtained was the creation of and partial test of an intervention proposal in the hemodialysis unit. This proposal was conceived in two fronts: the support to the adaptation period of patients and patient education regarding diet. The last one was tested with the users and was well accepted by them. However, it was not possible to measure whether there was improvement in the experience of patients or in their relationship with diet, after contact with the Nutritional Guide.


FOOD THAT SHOULD BE AVOIDED:

- Processed meats (ham, mortadella or salami, sausage, bacon);
- Cheese (canastra cheese, yellow cheese, mozzarella);
- Canned soup and noodles;
- Canned products (corn, peas, olives, palmetto, sardine);
- Chips, salted cookies;
- Processed spices (knorr, maggi, sazon, etc);
- Sauces (tabasco, salad dressing, ketchup, shoyu, pepper);
- Ready-cooked meals (lasagna, strogonoff, pizza, hamburguer);
- Mayonnaise;
- Salt and ajinomoto.

Figure 3. Material provided by the hospital to hemodyalisis patients.

After each stage of the project and its partial results, it was possible to established two comparisons: one between the application of the methodology in the literature and in practice and another between the activities that were proposed in the beginning of the project and those that were actually performed. At the end there will be an critic analysis about the results and the description of some opportunities for improvement.

The first stage of the project was the preliminary immersion used as a method to insert the team in the context of hospital and diagnosis of the problems to be addressed. This phase lasted about two months and during this period, the team faced two major challenges: dealing with terms and issues of the medical environment and understanding the operation dynamics of the hospital. Because of these challenges, the preliminary immersion extended for more than the time foreseen in the schedule (there were three areas to be studied). Importantly, the literature does not tell that the project team should determine the focus of activity within the institution; usually the client presents this demand (BROWN, 2009). The research methods used were the Exploratory Research and Research Desk, considered among those cited in the literature, the most suitable for the first stage of the project, resulting in essential information for the initial understanding of the hospital and about the different areas. Other complementary methods as Reframing could have been used to assist the team in these tasks (VIANNA et al., 2012). However, the mentioned methods were sufficient to achieve the objectives. The results of this phase can be considered instructive for the team and for the hospital, because they showed the prints that the administration and the users (doctors, patients, nurses, etc.)

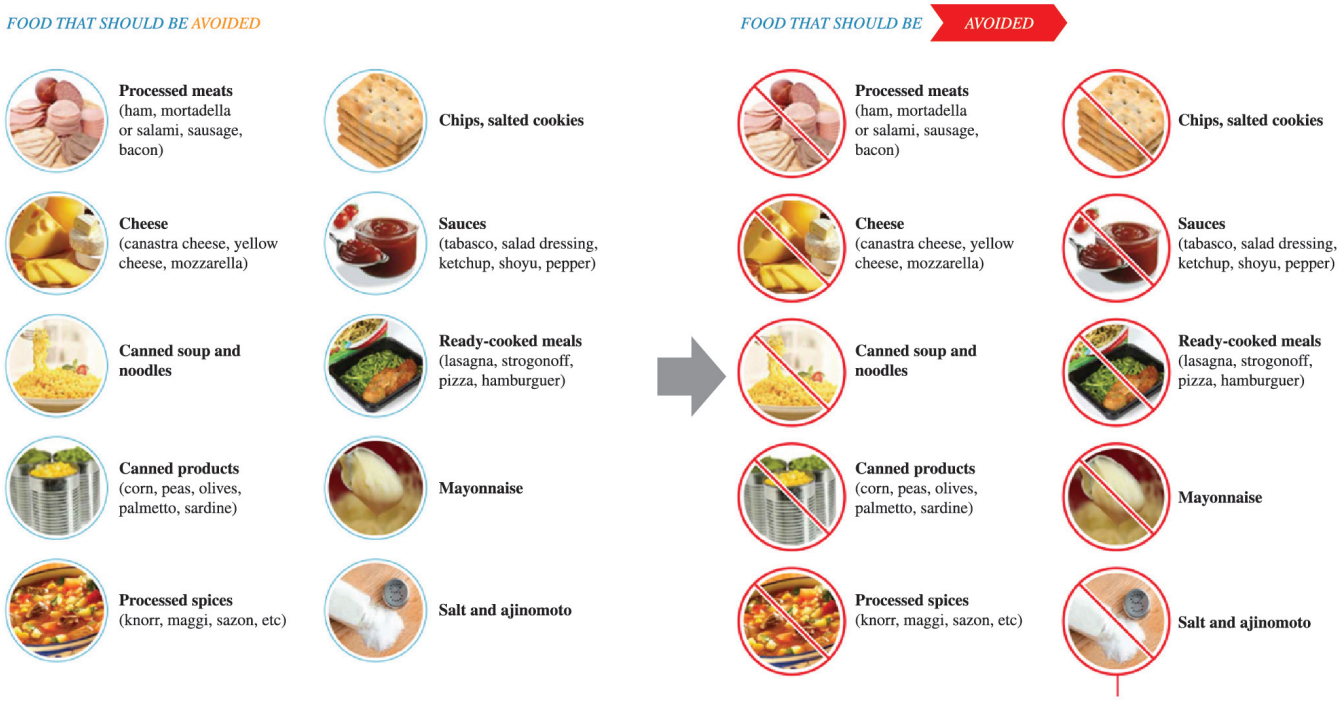


Figure 4. First version of material proposed by research team (left) and improvement resulted of the tests made with the users (right).

had about each area. Maps with the central issues of the hemodialysis unit, ward of terminally ill patients and volunteers were prepared with the challenges that the team found in each area.

The literature does not determine what should be the ideal results for each step but what should be the main objectives in each. Therefore, the material and the activities developed are different and vary according to the reality of each project. This happens due to the experimental and exploratory nature of DT (BROWN, 2008). This flexibility of the methodology itself was crucial not only to the progress of the project, but also to the emergence of the difficulties faced by the team, mainly because the application of DT in the health sector is a relatively unexplored issue (JONES, 2013). Thus, working with the data, synthesize them and generate the first results were moments of great uncertainty for the project team. Finally, the preliminary immersion lasted for two months when the plan was only thirty-five days, which resulted in a shorter time to the next steps of the project.

The second stage of the project was the In-depth Immersion that aimed to map the real needs, desires and behaviors of users (VIANNA et al., 2012), in this case patients of the hospital. Moreover, it serves to empathize with these users and identify extreme behaviors, aiming to thoroughly understand the context of the problem. In this project, this phase lasted two weeks. Whereas it should be a period of intense learning, time for the In-depth Immersion was quite limited, which was aggravated by the lack of experience of the team in DT. Then, the experiences gained in the preliminary immersion were fundamental at this moment. When set the area to be imaged (hemodialysis unit), the team already had knowledge about patients and their conditions. The main difference between theory and practice was the use of these approaches in a shortest time.

The phase analysis and synthesis is essential for a DT project and it aims to relate the data and understand it, to gain insights and to determine possibilities. This step was performed as describes the method that was adopted, however, among the visual material described in this model (blueprint, affinity diagram, guiding criteria, empathy maps etc...) only the personas were produced because the project was behind schedule in relation to the original plan. This material enriches the generated solutions because they allow a thorough analysis of the problem.

During the ideation, it is recommended to allocate a period that the team can co-create with the client which develops real and applicable solutions. However, this step could not be performed, due to the lack of availability of the team to meet with the hospital team. Still in ideation, the team met to produce user journeys.

The user journeys, among other tools, intent to identify the polarities or extreme user characteristics and their interactions during a process. From personas, produced

in the previous step, and user journeys, it was possible to develop solutions to the challenge initially proposed, even without use of meetings of co-creation that are an essential activity in a project of DT (HASSI; LAAKSO, 2011; DREWS, 2009). The solutions were generated from several discussions between the team members of the project, but it was realized that there was a lack of a consistent view from the perspective of users, for example, a nurse or patient.

A process of DT recommends using visualization techniques as a means to make tangible ideas (CARR et al., 2010; DREWS, 2009; LOCKWOOD, 2010), and the prototype is the principal of these techniques. In this case the team proposed the creation of a nutritional guide for patients and the support for their period of adaptation, based on the user journey. The guide was developed by a designer and tested at the hospital by one of the team members. This activity had little participation of the team, since professionals who did not accompany the project from the beginning developed it. Thus, members contributed to formulating the contents of the guide, but not for its construction. In addition, a second prototype was proposed, the planning for the welcoming of hemodialysis patients, which should be attended by the staff at the hospital to be tested, however, it was not possible due to lack of availability of staff to do so. It was possible to test the guide with patients, leading to changes in the initial idea proposed by the designer. However, according to literature, prototyping should be a phase of constant testing and evaluation of the prototype (BOLAND; COLLOPY, 2004; RYLANDER, 2009) and this assumption was not met adequately in the project.

5.1. Analysis of the results

Generally, the results of the project reflected the characteristics of the team, both with respect to the time available to implement the project, as compared with the experience and maturity to implement the DT, which reinforces the importance of preparation and characteristics of team project. The literature does not describe a specific process of DT, does not determine which techniques should be used and what should be the material produced by the team. The DT fits the context of the project, but this is not a singularity of this method. A methodology is subject to context variables, which modifies the results and the application process itself. This situation, however, demonstrated the need for a truly interdisciplinary team (with the direct participation of the designer and the staff of the hospital, for example) and more mature about the methodology. A little direct participation of the consultant (who was involved in other projects) has been considered as an important element for the results that did not reach expected. In addition, the limited availability of the hospital staff also proved to be a limitation, especially in periods of immersion.

What could be seen was the difficulty of using some of the elements of DT during the project, as described by Hassi and Laakso (2011) and Brown (2009): feasible, desirable and viable solutions; multidisciplinary team; visualization and prototyping of ideas, use of abductive thinking, convergence and divergence of thought. During the project, the team always tried to visualize the ideas and prototyping was always present while all project activities, primarily to facilitate the visualization. On the other hand, the low maturity of the team in the application of DT impaired the abduction, convergence and divergence of thought, practices that are considered as highly important in the literature (DREWS, 2009; LOCKWOOD, 2009; HASSI; LAAKSO, 2011).

In conclusion, one can say that a methodology for DT, although described as accessible and flexible, must be well planned to minimize the possible challenges that arise throughout the project. Furthermore, the short duration of the project indicates that the team should have enough time to devote to the experience to assure better results. The literature, although it offers many options and few concrete definitions on using DT, figure as an important guide for a project. In this project the results could have achieved a higher level of success, if the schedule and the literature were used as a base and if they were followed more consistently.

5.2. Recommendations for improvement

From all the analysis about the results and experience gained from the project, some recommendations are suggested for better implementation of the DT. First, it is important that the team is in a proper environment for method development. Organizational culture can provide greater motivation, greater involvement with the methodology itself and greater freedom and inspiration to create. Furthermore, organizational climate ensures a formality, which although appears not to be present in the DT, is essential for application of a method that determines the formation of a multidisciplinary team and therefore covers quite varied contexts.

The implementation period of the project should be planned to ensure availability and effective participation of the users involved. In the case of the hospital, as staff and employees could not devote themselves fully to the activities, the schedule duration was extended and some steps could not be conducted.

The team must rely on professionals related to areas of the context of the problem. This provides solutions that meet the proposed criteria and widely contemplate the desire of users. Without a truly multidisciplinary team, the ideas and solutions become limited.

Experience and familiarity with the methodology of the DT is very important to the project. This experience is directly associated with the fulfillment of important assumptions. If it is not possible that all members are experienced, then there must be someone among those who already have knowledge about the method and that can guide the activities.

6. Conclusion

The Design Thinking is a methodology that uses the design tools and methods to generate innovations focused on humans (BROWN, 2008) and in this paper the DT has been applied to an institution in the health sector. At the beginning of the project, it was expected that the application of DT in the hospital would provide the identification of opportunities for improvement in the provision of services and the creation of innovative solutions, through the participation of different system users.

The low availability of literature on the DT applied to the health sector, and the inexperience on the part of the team, were the main limitations faced during project execution. These limitations had big influence on the results that were considered superficial and on the innovations suggested that had incremental character. For the hospital, it is believed that the project was an opportunity to consider areas of improvement and the first step to upgrade the experience of its users, which can bring benefits in the future, especially if the DT approach is replicated in other situations.

Five factors influenced the application of the methodology in the hospital: team availability, planned time for the duration of the project, lack of experience and maturity of the team with respect to DT, complex application context (hospital) and little information available on literature on the application of DT in the health sector (as noted by Jones (2013)). On the other hand, even though the proposed changes (in the case of the nutritional guide) are considered incremental and cannot be evaluated quantitatively, the hospital evaluated the proposal very positively, a fact emphasized by the representative of the institution in the final meeting where the results of the project were presented. The temporal restriction on participation and involvement in the project, either by the consultant who was responsible for coordination, either by the hospital staff, proved decisive for the results. Furthermore, one must consider the fact that the methodology was not the entire domain of the team. Nevertheless, it is considered that the results are encouraging, taking into account conditions found. The DT effectively proved to be a useful tool for improving the conditions found in health.

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